CITY OF PIEDMONT

CLIMATE ACTION PLAN

March 2010

CITY OF PIEDMONT
CLIMATE ACTION PLAN

MARCH 2010

City Council

Dean Barbieri - Mayor
John Chiang - Vice Mayor
Garrett Keating - Councilmember
Jeff Wieler - Councilmember
Margaret Fujioka – Councilmember
Abe Friedman – Former Councilmember

City Staff

Geoffrey Grote – City Administrator
Lawrence A. Rosenberg – Director of Public Works
Kate Black – City Planner
Kevin Jackson - Assistant City Planner

Consultants to the City

AECOM
2022 J Street
Sacramento, CA 95811
www.aecom.com

AECOM

Table of Contents

Preface
The Climate Action Plan iii
Public Input iv

Chapter I Summary
Mayor's Statement I-1
Purpose and Scope of the Climate Action Plan I-2
Purpose I-2
Scope I-2
The Challenge I-3
What is the Greenhouse Effect? I-3
Global GHG Emissions I-3
California GHG Emissions I-4
Cause for Concern I-4
California Regulatory Context I-5
Assembly Bill 32 (2006) I-5
Executive Order S-3-05 ..... I-6
Additional California Climate Change Legislation I-6
Piedmont's GHG Emissions and Reduction Target I-7
Action I-9
Achievements to Date I-9
Climate Action Plan Strategies I-11
Climate Action Plan Measures I-11
Statewide Regulations I-20
Implementation I-20
Approach I-21
Plan Adjustments and Flexibility I-21
Moving Forward I-21

Chapter II GHG Baseline, Projections, and Target
Baseline II-1
Methodology II-1
GHG Emissions Inventory by Sector II-3
Emissions Baseline II-4
Energy Consumption II-5
Water Consumption II-5
Projections II-6
Energy II-7
Transportation II-9
Waste II-9
Water Consumption II-10
GHG Emissions Reduction Target II-10

Chapter III Climate Action Strategies

Strategies III-1
The GHG Reduction Potential of CAP Strategies and Objectives III-2
Structure of the Strategy Chapter III-4
Selection of Measures and Action Steps III-6
Building and Energy Strategy III-6
Waste and Water Strategy III-20
Waste III-20
Water III-23
Transportation and Land Use Strategy III-29
Additional Emission Reductions from Statewide Legislation III-40
Statewide Reductions in Relation to CAP Measures III-42

Chapter IV Implementation

Approach IV-1
Implementation Matrices IV-2
Funding Strategies IV-10
State and Regional Grants IV-10
American Recovery and Reinvestment Act Funding IV-11
Other Public Finance IV-14
Partnerships with Private Companies and Other Organizations IV-16
Partnerships with Other Jurisdictions IV-19
Plan Adaptation and Evolution IV-19

Chapter V Public Participation

Outreach Methods V-1
Environmental Task Force V-1
Community PowerPoint Presentation V-2
Climate Action Survey V-2
City Council Hearings V-5
Community Workshop V-5
Attachments V-5

Appendices

A Climate Action Plan Strategies Calculations Detail and Assumptions
B Public Outreach
C Measure Cost Analysis

Preface

The Climate Action Plan

Piedmont's Climate Action Plan (CAP) was prepared in 2008-2009 by City staff and consultants, with input from the public, and grant support from the Bay Area Air Quality Management District and the Alameda County Waste Management Authority and Source Reduction and Recycling Board (StopWaste.org).

The CAP consists of a summary chapter and six technical chapters. The Summary Chapter defines climate change and its potential effects, outlines the actions the State and City are taking to address climate change, and describes how residents and business owners can participate in greenhouse gas (GHG) reduction efforts. The technical chapters detail the City's strategy to be consistent with applicable state regulation and provide guidance to City officials and departments charged with implementing the plan. They consist of the following:

- **Climate Change Effects** – This chapter describes the predicted effects of climate change on the earth, California, and Piedmont based on the current state of climate science.
- **California Regulatory Context** – This chapter describes the numerous California regulations that set the context for climate action planning, as well as related regional and local climate change initiatives and programs.
- **GHG Baseline, Projections, and Targets** – This chapter presents what we know regarding Piedmont's current GHG emissions, projected future emissions for 2020 and 2050, and action by the City Council to establish a reduction target.
- **Climate Action Strategies** – This chapter proposes strategies and measures the City can take to achieve its emissions reduction target.
- **Implementation** – This chapter discusses how the City will monitor the Climate Action Plan to ensure that the proposed strategies and measures achieve reduction targets, and describes available funding strategies.
- **Public Participation** – This chapter describes the role public participation played in the formulation of the CAP. The chapter specifically discusses the outreach methods used and summarizes the input provided.

Public Input

Piedmont residents participated in the formulation of this CAP and were vital to its success. Community members provided valuable input that was used to select GHG reduction measures and assisted in the review and revision of the Plan. Community support for the CAP is critical to its success, and community members will continue to take an active role in implementing the plan and monitoring its effectiveness over time.

A variety of outreach methods were used during plan preparation including public meetings of the Piedmont Environmental Task Force (ETF), a web-based community survey, and a community workshop with Piedmont residents. The ETF met three times to review and discuss: 1) the objectives of the CAP work program; 2) preliminary results of the community survey; and 3) the GHG inventory, projections, and reduction targets and preliminary draft GHG reduction strategies and measures.

The City also sponsored an online climate action survey between October 2008 and June 2009 to provide input for the CAP. Over 190 responses to the survey were received. The survey consisted of 21 questions regarding transportation choices, home and business energy use, community shopping and services, renewable energy, water conservation, and waste reduction. The survey also asked residents to identify the level of support they would offer the City with regard to implementing mandatory requirements versus incentive-based programs to achieve GHG reductions.

The City conducted a CAP community workshop in on May 27, 2009. The workshop focused on proposed GHG reduction strategies and measures to be contained in the Draft CAP. The workshop also allowed the public to provide comments on the preliminary draft strategies and measures.

Chapter I
Introduction

VISION

Human-induced climate change is a global crisis with the potential for environmental and social misfortune. Ever mindful of the consequences this crisis poses to future generations, the residents of Piedmont recognize that we must all take action to reduce greenhouse gas emissions. By acting locally, our small city can make a contribution to a worldwide effort. Accordingly, the City of Piedmont has developed this Climate Action Plan in a significant step toward achieving our greenhouse gas reduction goals.

Mayor's Statement

Dear Piedmont Residents,

I am pleased to introduce Piedmont's Climate Action Plan. As the embodiment of the local community, city government can provide leadership in efforts to reduce our carbon footprint. Recognizing this in 2006, the City of Piedmont became a participant in ICLEI's Cities for Climate Protection campaign, joining more than 1,000 local governments worldwide in committing to a 5-Milestone methodology for combating global warming.

The City completed the first milestone in December 2006 by approving a baseline emissions inventory, which indicates that City of Piedmont released 47,754 metric tons of carbon dioxide equivalent ($MTCO_2e$) in 2005. Milestone two was completed in April 2009 when the City Council adopted a target to reduce community-wide greenhouse gas emissions by 15% below 2005 levels by 2020. The development and adoption of the Climate Action plan will complete Milestone three. The remaining two Milestones will be implementing this plan and monitoring and documenting the results.

At recent meetings and hearings and through an on-line survey, Piedmont residents have made it clear that global warming and the impact it will have on future generations is an important issue. Many of you have contributed your thoughts and ideas concerning measures the city and residents should take to reduce greenhouse gas emissions. These include improvements in energy efficiency and renewable energy and changes in areas such as transportation, recycling and landscapes. This valuable input from residents has informed the Climate Action Plan so that it is truly a document of our common interests.

I am certain that with the guidance of this plan both the City government and Piedmont residents can together make meaningful changes in our everyday lives and operations to reduce our carbon footprint. I look forward to working together toward a more sustainable future for Piedmont and for all of us!

Sincerely,

Abe M. Friedman
Mayor

Purpose and Scope of the Climate Action Plan

Purpose

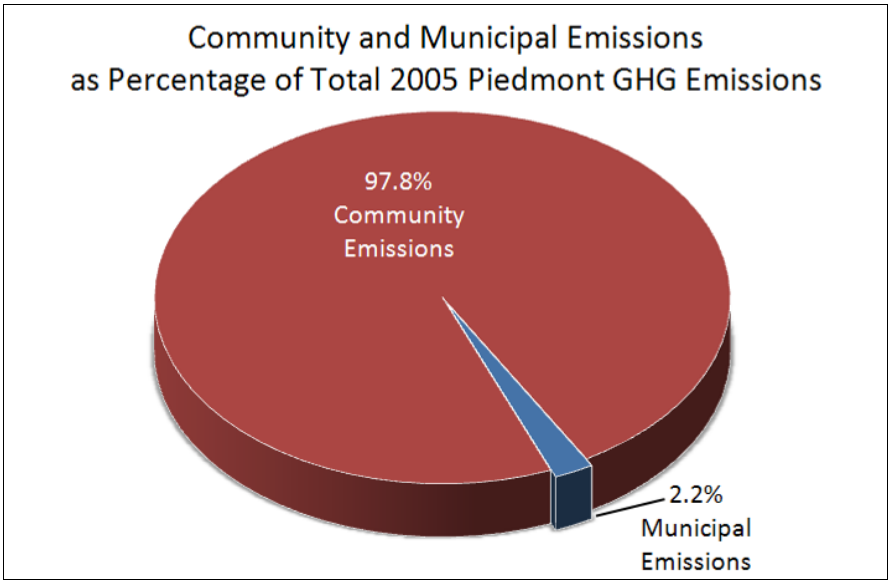
The Climate Action Plan (CAP) outlines a course of action for the City government and community of Piedmont to reduce greenhouse gas (GHG) emissions to 15% below 2005 levels by 2020. The CAP has been designed to support three primary functions:

- provide clear guidance to City staff regarding when and how to implement key provisions of the plan,
- inspire residents and businesses to participate in community efforts to reduce GHG emissions, and
- demonstrate Piedmont's commitment to comply with state GHG reduction efforts.

Scope

The CAP is intended to reduce GHG emissions generated in municipal and community-wide activities. GHG reductions will be achieved in the areas of building and community energy use, waste diversion, water conservation, and transportation. The plan contains strategies, objectives, measures, and actions that will direct the City's reduction efforts.

The timeframe for the CAP extends from the date of adoption through December 31, 2020. Over the coming decade, the City will facilitate considerable changes both within its operations and throughout the community.



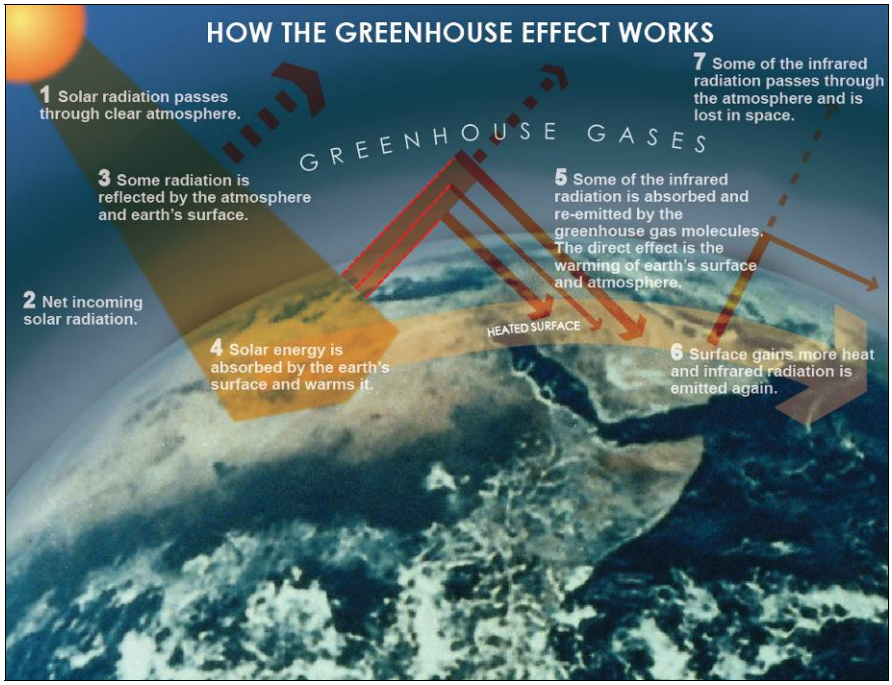
The Challenge

What is the Greenhouse Effect?

"Dangerous Climate Change"- *The most serious consequences of global warming might be avoided if global average temperatures rise by no more than 2.5 °F above current levels.*

*- **UK Department of Environment, 2004***

The greenhouse effect is the warming of our climate that results when the atmosphere traps heat radiating from Earth toward space. Certain gases in the atmosphere act like the glass in a greenhouse – allowing sunlight to pass into the greenhouse, but blocking the heat from escaping into space. The gases that contribute to the greenhouse effect include water vapor, carbon dioxide (CO_2), methane, nitrous oxides, and chlorofluorocarbons (NASA 2009). While the greenhouse effect is essential to life on earth, emissions from burning fossil fuels, deforestation, and other causes have increased the concentration of greenhouse gases (GHGs) to dangerous levels.

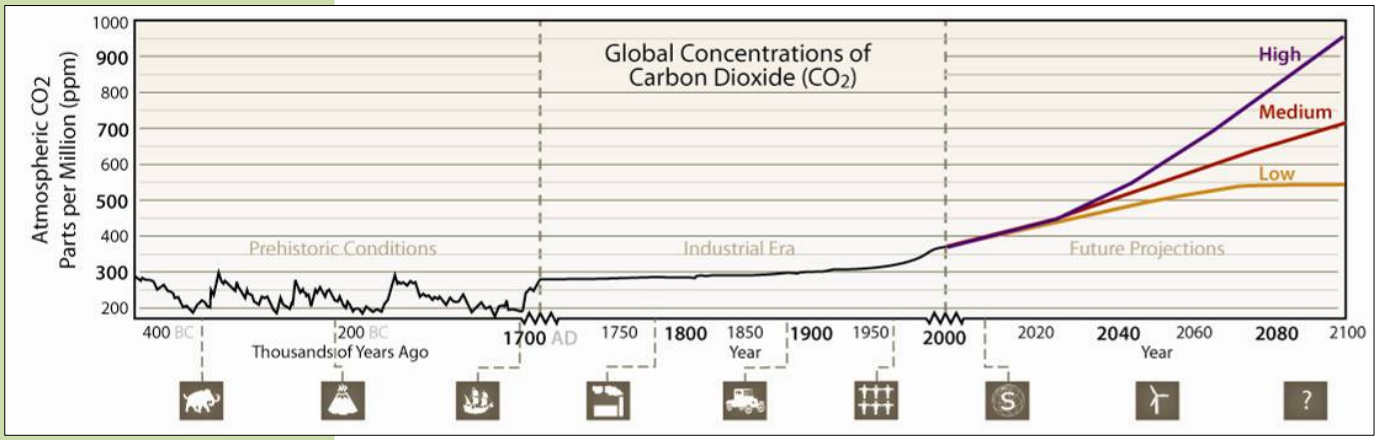

HOW THE GREENHOUSE EFFECT WORKS
1 Solar radiation passes through clear atmosphere.
2 Net incoming solar radiation.
3 Some radiation is reflected by the atmosphere and earth's surface.
4 Solar energy is absorbed by the earth's surface and warms it.
5 Some of the infrared radiation is absorbed and re-emitted by the greenhouse gas molecules. The direct effect is the warming of earth's surface and atmosphere.
6 Surface gains more heat and infrared radiation is emitted again.
7 Some of the infrared radiation passes through the atmosphere and is lost in space.
GREENHOUSE GASES
HEATED SURFACE

Global GHG Emissions

Data describing atmospheric GHG concentrations over the past 800,000 years demonstrates that concentrations of CO_2, the main GHG, have increased since pre-industrial times, from approximately 280 parts per million (ppm) to approximately 353 ppm in 1990 and approximately 379 ppm in 2005.

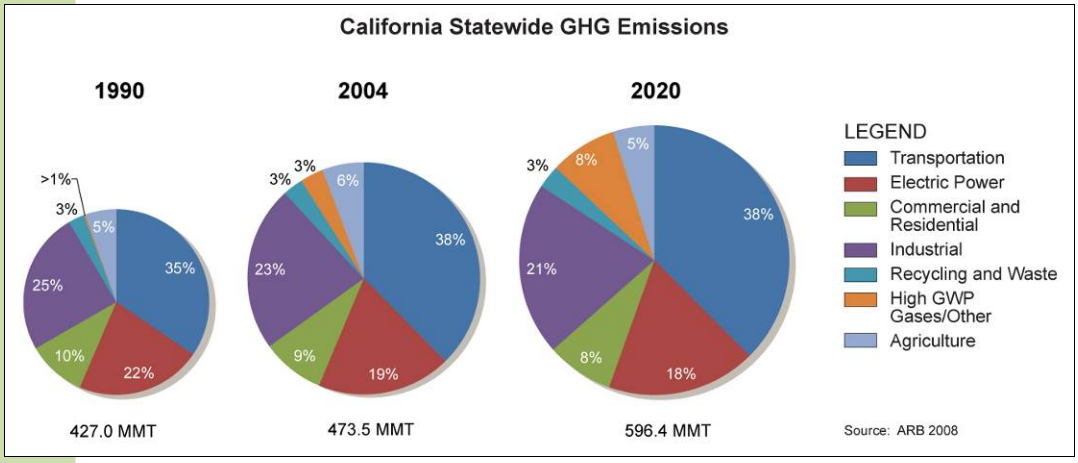
In 2000, the United Nations International Panel on Climate Change (IPCC) described potential global emission scenarios for the coming century. The

scenarios vary from a best-case characterized by low population growth, clean technologies, and low GHG emissions; to a worst-case where high population growth and fossil-fuel dependence result in extreme levels of GHG emissions. While some degree of climate change is inevitable, most climate scientists agree that in order to avoid *dangerous* climate change, atmospheric GHG concentrations need to be stabilized at 350-400 ppm.



California GHG Emissions

Between 1990 and 2004, California's annual GHG emissions increased 11% from 427 million metric tons (MMT) to 474 MMT. If emissions continue to increase at business-as-usual rates, statewide emissions are expected to increase to approximately 600 metric tons by 2020, a 40% increase above 1990 levels. In order for the State to participate in global efforts to avoid dangerous climate change, California's GHG emissions need to be reduced to at least 1990 levels by 2020 and 80% below 1990 levels by 2050.



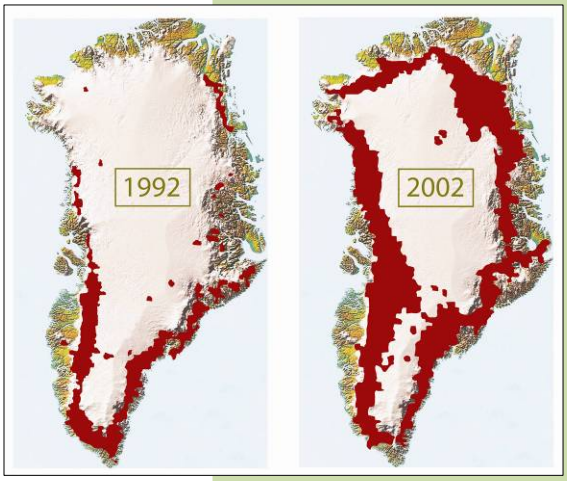
Cause for Concern

Global Effects of Climate Change

Observations from around the world demonstrate that the earth's global average air and ocean temperatures have steadily increased over the past 100 years. Between 1995 and 2006, all but one of the years ranked as the warmest year on record. In addition to increased temperatures, other evidence indicates

that our planet's climate is warming. Rapid levels of glacial melt, decreases in the extent of Northern Hemisphere sea ice, shorter freezing seasons, and decreases in snowpack quantities are a few of the changes. Increasing temperatures threaten the world's ecological, social, and economic systems. Notable examples of potential effects include:

- More frequent and intense extreme weather events (i.e. hurricances)
- Increased stress on water resources
- Coastal areas at greater risk from sea-level rise and storm surges
- Reduced food security
- Increased threats to human health (i.e. mosquito-borne diseases)
- Ecosystem loss or degredation
- Economic and geopolitical disruption



Glacial Melt Extent in Greenland

Effects of Climate Change in Piedmont

To date, the implications of climate change have primarily been examined at global and regional scales. Due to the scale of current models, it is difficult to identify the specific effects that climate change may have on an individual city. That said, climate change effects on water supply have been examined at a scale relevant to Piedmont.

The East Bay Municipal Utility District (EBMUD) 2040 Water Management Plan examines the potential effects of climate change on both water supply and on the utility's extensive storage and distribution infrastructure. EBMUD water supplies are most vulnerable to a potential shift in the timing of springtime runoff from the April-to-July period to winter months, and to decreases in annual runoff volumes. As EBMUD provides the City of Piedmont's water supply, such effects could reduce water availability in the community in the future.

California Regulatory Context

California has adopted a wide variety of regulations aimed at reducing the State's GHG emissions. While State actions alone cannot stop global warming, the adoption and implementation of this legislation demonstrates California's leadership in addressing this critical challenge. Key legislation pertaining to the State's reduction targets are described below.

State of California Global Warming Targets:
Assembly Bill 32 (AB 32)
Reduce Greenhouse Gas Emissions to 1990 Levels by 2020
Executive Order S-3-05 (EO - S-3-05)
Reduce to 80% below 1990 Levels by 2050

Assembly Bill 32 (2006)

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, requires California to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 directs the California Air Resources Board (ARB) to develop and implement regulations that reduce statewide

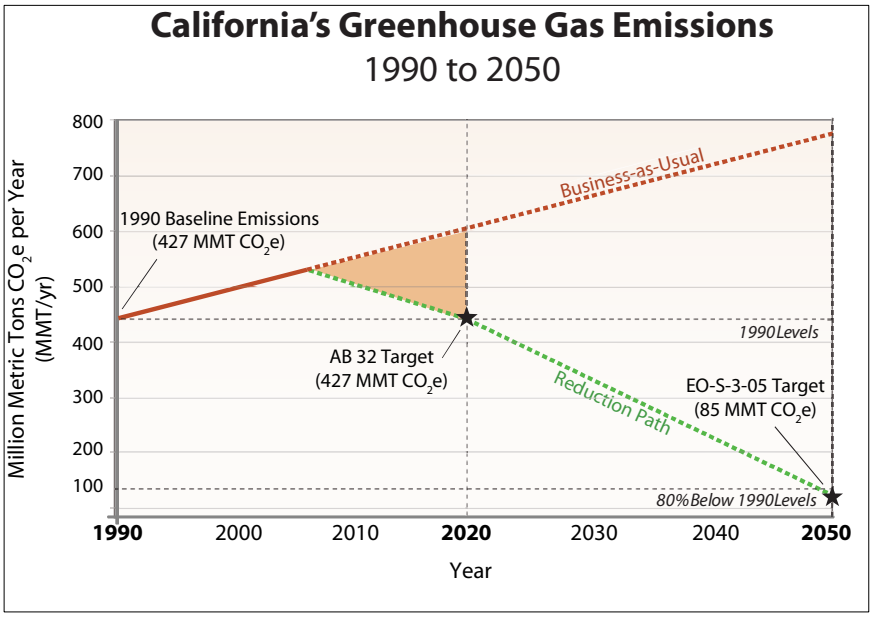
GHG emissions. AB 32 requires ARB to adopt a quantified cap on GHG emissions that represents 1990 emissions levels, institute a schedule to meet the emissions cap, and develop tracking, reporting, and enforcement tools to ensure that the State achieves the required GHG emissions reductions.

Climate Change Scoping Plan

The *Climate Change Scoping Plan* was approved by ARB in December 2008 and outlines the State's plan to achieve the GHG reductions required in AB 32. The Scoping Plan contains the primary strategies California will implement to achieve a reduction of 169 MMT of carbon dioxide equivalent (CO_2e), or approximately 28% from the State's projected 2020 emission level.

Executive Order S-3-05

Executive Order S-3-05 (EO-S-3-05) recognizes California's vulnerability to reduced snowpack in the Sierra Nevada Mountains, exacerbation of air quality problems, and sea level rise due to a changing climate. To address these concerns, the executive order established targets for reducing GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050.



Additional California Climate Change Legislation

Assembly Bill 1493 (2002)

AB 1493 requires ARB to develop and adopt regulations to reduce GHG emissions from passenger vehicles, light-duty trucks, and other non-commercial vehicles for personal transportation. In 2004, ARB approved amendments to the California Code of Regulations adding GHG emissions standards to California's existing standards for motor vehicle emissions.

Executive Order S-1-07 (2007)

EO-S-1-07 establishes a Low-Carbon Fuel Standard to reduce the carbon intensity of transportation fuels sold in California by a minimum of 10% by 2020.

Senate Bill 375 (2008)

SB 375 aligns regional transportation planning efforts, regional GHG reduction targets, and affordable housing allocations. Metropolitan Planning Organizations (MPO) are required to adopt a Sustainable Communities Strategy (SCS), which allocates land uses in the MPO's Regional Transportation Plan. Qualified projects consistent with an approved SCS or Alternative Planning Strategy and categorized as "transit priority projects" would receive incentives under new provisions of the California Environmental Quality Act (CEQA).

Senate Bill1078 (2002) and 107 (2006) and Executive Order S-14-08

SB 1078 requires retail sellers of electricity to provide at least 20% of their supply from renewable sources by 2017. SB 107 changed the target date to 2010. Executive Order S-14-08 expands the state's Renewable Energy Standard to 33% renewable power by 2020.

Senate Bill 1368 (2006)

SB 1368 requires the California Public Utilities Commission (PUC) to establish a GHG emission performance standard for baseload generation from investor-owned utilities, and requires the California Energy Commission (CEC) to establish a similar standard for local publicly owned utilities. The legislation further requires that all electricity provided to California must be generated in plants that meet standards set by PUC and CEC.

Executive Order S-13-08 (2008)

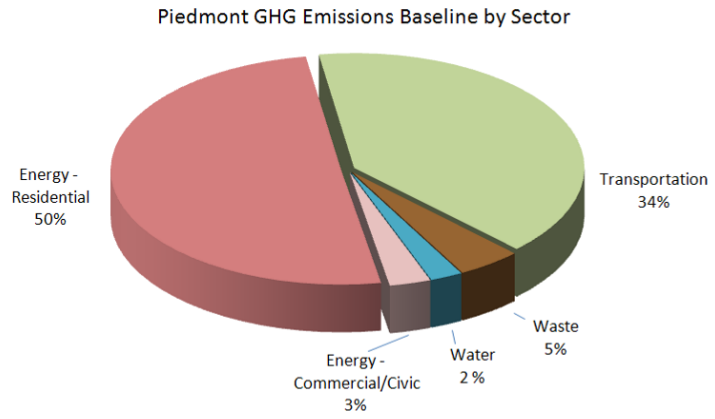
EO-S-13-08 directs the Governor's Office of Planning and Research, in cooperation with the California Resources Agency (CRA), to provide land use planning guidance related to sea level rise and other climate change impacts. The order also directs CRA to develop a State Climate Adaptation Strategy by June 30, 2009 and to convene an independent panel to complete the first California Sea Level Rise Assessment Report.

Piedmont's GHG Emissions and Reduction Target

Baseline and Projections

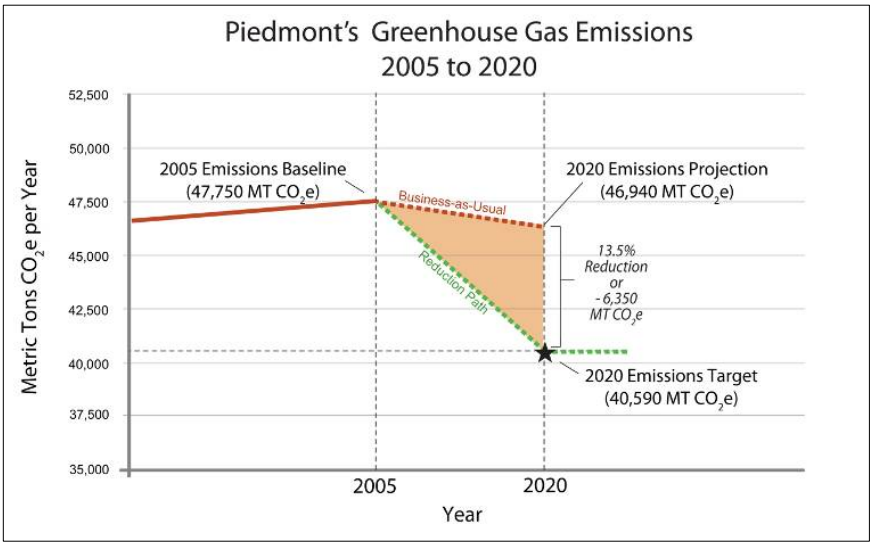
In 2005, the City and community of Piedmont generated 47,750 metric tons of carbon dioxide equivalent ($MTCO_2e$). More than half of these emissions resulted from residential, civic, and commercial building energy consumption. Transportation contributed just over a third of the total and waste and water consumption made up the remainder. In the short term, transportation emissions are expected to decrease because of lower emissions from newer

vehicles. These decreased emissions would likely outweigh expected increases in vehicle miles traveled (VMT). However, in the long term, projected increases in VMT outweigh decreased vehicle emissions resulting from improved fuel efficiency. Thus, the City's GHG emissions would be expected to decrease to about 46,944 $MTCO_2e$ in 2020, and then increase to about 55,240 $MTCO_2e$ in 2050. This represents a 1.7% decrease in the short term and 16% increase over the 2005 baseline level in the long term. Additional information regarding Piedmont's baseline and projected GHG emissions is provided in Chapter II.



Piedmont's GHG Reduction Target

The City of Piedmont recognizes the critical importance of addressing climate change. In 2009, the City established a GHG reduction target that aims to contribute to the stabilization of global GHG emission concentrations and the achievement of AB 32 goals. Piedmont's adopted target requires the community's GHG emissions to be reduced by 15%, or 7,160 $MTCO_2e$, below 2005 baseline emission levels by 2020. Because emissions are projected to decrease to 46,944 $MTCO_2e$ in 2020, these reductions will need to total 6,350 $MTCO_2e$.



Action

Achievements to Date

The City of Piedmont has implemented a number of policies, programs, and incentives to assist the community in preserving the local environment. Existing programs and policies relevant to community GHG emissions reductions include the following:

- **50% Construction and Demolition (C&D) Debris Recycling Ordinance** – In 2007, the City adopted an ordinance that requires projects with a valuation of $50,000 dollars or more to divert 50% of construction or demolition-related waste from the landfill. Additionally, the City Council approved a Recyclable C&D Materials Incentive Program, which subsidizes a portion of the C&D recycling costs.
- **75% Diversion Recycling Goal Resolution** – In 2008, the City adopted a resolution to achieve 75% waste reduction and diversion by 2010. The City has established a curbside recycling program for plastics, plastic bags, polystyrene, aseptic containers, and batteries. Food scraps and food soiled paper waste are collected with yard debris. The City's food scrap composting program has achieved a 50 to 60% participation rate among Piedmont residents.
- **Civic Green Building Ordinance**– In 2008, the City Council approved an ordinance that requires major civic building projects to follow established green building standards.
- **Civic Bay-Friendly Landscaping Ordinance** – In 2009, the City Council approved an ordinance requiring use of Bay-Friendly Landscape practices on all major municipal landscaping projects (≥$100,000).
- **Food Scrap Recycling Program** – In 2009, the City implemented a food scrap recycling program as part of weekly collection services. Residents, business owners and schools may place food scraps and food-soiled paper in their green organics carts. The material is sent to a facility where the waste is turned into compost for use by farmers, landscapers, and home gardeners.
- **Municipal Retrofits**– The City has conducted a number of energy and water efficiency upgrades on municipal buildings and facilities. Improvements include retrofits of interior lights, appliance upgrades in the fire station, installation of low-flow toilets, and implementation of a number of water conserving measures in municipal landscapes.
- **Bus Stop Improvements** – In 2008, the City constructed a covered bus stop at the intersection of Highland Avenue and Highland Way.
- **Smart Growth Policies** – The recently updated General Plan contains two policies that encourage smarth growth in the community. Policy 2.2 encourages mixed use development in the Grand Avenue commercial district. Policy 2.6 calls for pedestrian oriented and mixed-use multi-family residential development in the Commercial Zone.

While all of the policies and programs listed above have the potential to reduce GHG emissions, data limitations restrict the City's ability to quantify their reduction capacity.

Piedmont
Climate Action Plan Strategies:
Buildings & Energy
7,020 Metric Tons
+
Waste & Water
2,150 Metric Tons
+
Transportation & Land Use
810 Metric Tons
=
Total GHG Emissions Reductions
9,980 Metric Tons

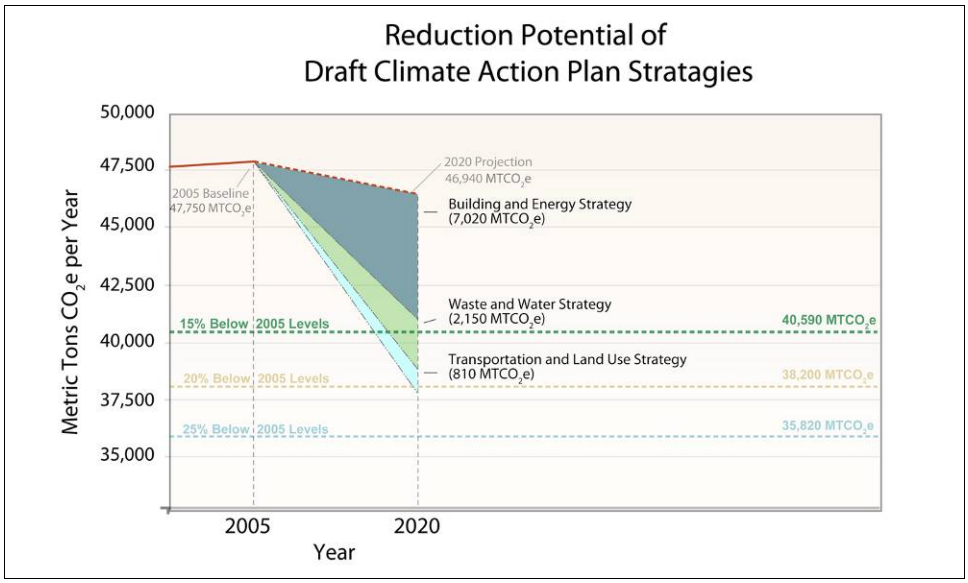
Climate Action Plan Strategies

Building from the City's tradition of environmental leadership, the CAP sets forth a plan to considerably reduce the community's GHG emissions. The City's 2020 target can be achieved through implementation of four principle strategies directed toward the following GHG reduction opportunities within the community.

Buildings and Energy: The buildings and energy strategy recommends energy efficiency retrofits for both existing buildings, enhances energy performance requirements for new construction, increases use of renewable energy, and improves community energy management.

Waste and Water: The waste and water strategy builds on past City successes by increasing waste diversion rates and recommending water conservation measures applicable to both indoor and outdoor water use.

Transportation and Land Use: The transportation and land use strategy identifies ways to reduce automobile emissions, including improving pedestrian and bicycle infrastructure, enhancing carpooling and public transit service, supporting pedestrian- and transit-oriented development, and improving the City's vehicle fleet.



Each strategy contains *objectives*, *measures* and *actions* that translate the CAP's vision into on-the-ground implementation. Objectives refine the strategies into specific focus areas. Measures define the direction that the City will take to accomplish its GHG reduction goals. Actions define the specific steps that City staff and decision-makers will implement over time. Strategies, objectives, and measures are defined in Chapter III, and actions are provided in Chapter IV.

Climate Action Plan Measures

The CAP contains 31 GHG reduction measures. The City has quantified the GHG reduction potential of 20 of these measures. While the remaining measures will assist the community's overall climate action goals, their reduction potential was not quantified during the CAP preparation process. Tables I-1 and I -2 list the quantified and non-quantified measures respectively.

This page intentionally left blank.

Table I-1
Summary of CAP Measures - Quantified Reductions

Buildings and Energy Strategy - *Minimize energy consumption; create high-performance buildings, and transition to clean, renewable energy sources*					
Measures		**GHG Reduction Potential (MT CO_2e)**	**Percentage of Total GHG Reductions Achieved**	**Cost to City***	**Private Cost**
Objective BE-1: Reduce Energy Use in City Facilities					
BE 1.1	Install cost-effective renewable energy systems on all City buildings and purchase remaining electricity from renewable sources.	920	9%	Low	No
BE-1.2	Install building performance data (energy and water) displays in all City buildings.	Included within BE 1.1	-	Low	No
Objective BE-2: Consider Retrofitting Existing Residential Buildings					
BE-2.1	Consider developing and implementing point-of-sale residential energy and water efficiency upgrade requirements and/or incentives if necessary.	4,260	43%	Low	Yes
BE-2.2	Identify and consider developing financial incentives and low-cost financing products and programs that encourage investment in energy efficiency and renewable energy within existing residential buildings.	Included within BE-2.1	-	Low to Medium	Yes
BE-2.3	Educate residents about the availability of free home energy audit programs and encourage implementation of audit findings.	Included within BE-2.1	-	Low	No
Objective BE-3: Consider Retrofitting Existing Commercial Buildings					
BE-3.1	Consider developing and implementing point-of-sale commercial energy efficiency upgrade requirements and/or incentives if necessary.	40	< 1%	Low	Yes
BE-3.2	Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.	Included within BE-3.1	-	Low to Medium	Yes
BE-3.3	Partner with PG&E to provide a business education program that encourages commercial energy efficiency improvements.	Included within BE-3.1	-	Low	No
Objective BE-4: Consider Requiring Energy Performance in New Construction					
BE-4.1	Consider adopting additional standards for energy and water efficiency.	20	< 1%	Low	Yes
Objective BE-5: Maximize the Use of Renewable Energy					
BE-5.1	Develop a comprehensive renewable energy financing and informational program for residential and commercial uses.	1,620	16%	Low	Yes (unless property owner has a purchase agreement with a solar company)
Objective BE-6: Community Energy Management					
BE-6.3	Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.	160	2%	Low	No

Table I-1
Summary of CAP Measures - Quantified Reductions

Waste and Water Strategy - *Minimize waste and celebrate water as an essential community resource*					
Measures		**GHG Reduction Potential (MT CO_2e)**	**Percentage of Total GHG Reductions Achieved**	**Cost to City***	**Private Cost**
Objective WW-1: Become a Zero-Waste Community					
WW-1.1	Establish a zero-waste target for 2030 and work with Alameda County, neighboring cities, and other organizations to leverage the zero-waste effort.	1,380	14%	Low	No
Objective WW-2: Conserve Water Resources					
WW-2.2	Encourage use of graywater and rainwater collection in existing residential and commercial uses.	770	8%	Low	Yes
WW-2.3	Develop a water-efficient landscaping ordinance to implement the California Water Efficient Landscaping Ordinance and require or facilitate use of greywater or rainwater collection systems in new construction.	Included within WW-2.2	-	Low	Yes
Transportation and Land Use Strategy - *Shift Travel from Automobiles to Walking, Biking, and Public Transit*					
Measures		**GHG Reduction Potential (MT CO_2e)**	**Percentage of Total GHG Reductions Achieved**	**Cost to City***	**Private Cost**
Objective TL-1: Facilitate Walking and Biking in the Community					
TL-1.1	Consider expanding and enhancing bicycling and pedestrian infrastructure throughout the community if financially feasible and practical.	420	4%	Medium to High (depending on type of infrastructure and extent)	No
TL-1.2	Install bike racks in commercial and civic areas of the City where racks do not currently exist if financially feasible and practical.	180	2%	Low	No
TL-1.3	Consider incorporating pedestrian-friendly design features into the City's civic/commercial centers.	60	< 1%	Medium to High (depending on extent of redesign)	No
TL-1.4	Evaluate the potential for mixed-use development in Piedmont's existing commercial center.	30	< 1%	Low	No
Objective TL-2: Make Public Transit More Accessible and User-friendly					
TL-2.1	Work with AC Transit to conduct a public transit gap study and provide bus stops with safe and convenient bicycle and pedestrian access and essential improvements.	70	< 1%	Low	No
Objective TL-3: Reduce Vehicle Emissions and Trips					
TL-3.5	Provide public education regarding reducing motor vehicle-related greenhouse gas emissions.	50 (combined total for all education programs)	< 1%	Low	No

Please refer to discussion on Page I-19 for definition of costs to City.

Table I-2 Summary of CAP Measures - Non-Quantified Reductions				
Buildings and Energy Strategy - *Minimize energy consumption; create high-performance buildings, and transition to clean, renewable energy sources*				
Objective BE-4: Consider Requiring Energy Performance in New Construction				
Measures		**GHG Reduction Potential (MT CO_2e)**	**Cost to City***	**Private Cost**
BE-4.2	Provide development incentives for buildings that exceed the State's current Title-24 standards for energy efficiency by 25%.	Not quantified	Low	Yes
Objective BE-5: Maximize the Use of Renewable Energy				
BE-5.2	Join Bay Area efforts to ensure green public transit energy sourcing.	Not quantified	Low	No
Objective BE-6: Community Energy Management				
BE-6.1	Work with Alameda County to convert street lights to LED bulbs or LED-solar systems.	Not quantified	Low	No
BE-6.2	Research the feasibility of joining the Community Choice Aggregation efforts of Berkeley, Oakland, and Emeryville.	Not quantified	Low	No
Waste and Water Strategy - *Minimize waste and celebrate water as an essential community resource*				
Objective WW-1: Become a Zero-waste Community				
WW-1.2	Establish an environmentally responsible government purchasing policy.	Not quantified	Low	No
Objective WW-2: Conserve Water Resources				
WW-2.1	Encourage residential and commercial users to participate in EBMUD's free water audit program.	Not quantified	Low	No
WW-2.4	Facilitate the installation of weather-based evapotranspiration (ET) controller irrigation systems in both City and private landscapes.	Not quantified	Low	Yes
Transportation and Land Use Strategy - *Shift Travel from Automobiles to Walking, Biking, and Public Transit*				
Objective TL-3: Reduce Vehicle Emissions and Trips				
TL-3.1	Improve fuel efficiency of the City vehicle fleet by purchasing low- or zero-emission vehicles when vehicles are retired from service. (Emergency vehicles are exempt from this measure)	Not quantified	Low	No
TL-3.2	Provide preferential public parking spaces for electric and plug-in electric hybrid vehicles.	Not quantified	Low	No
TL-3.3	Facilitate ride-share opportunities for community residents.	Not quantified	Low	No
TL-3.4	Work with schools to improve/expand walking, school bus use, safe routes to school programs, and trip reduction programs.	Not quantified	Low	No

Please refer to discussion on Page I-19 for definition of costs to City.

Quantified Measures

Quantified measures fall into two sub-categories; primary measures and supporting measures. Primary measures provide direct GHG reductions that have been calculated and are identified within the table. Supporting measures facilitate the reduction potential of the related primary measure. The reduction potential of the supporting measure is contained within the potential of the primary measure. Supporting information describing how GHG reduction estimates were calculated is provided in Appendix A.

Generalized costs to the City and identification of whether or not the measure would result in costs to Piedmont home- or business-owners are provided for both measure types.

Costs to the City are identified using a ranking of low, medium, and high based on a proportional share of the City's Capital Improvement Program (CIP) or the Public Works Department budget, depending on which budget would provide funding for the measure. Table I-3 below shows the range in dollars for each corresponding to low, medium, and high rankings.

Table I-3
Average Annual Cost Range of CAP Measures

	Average Annual Cost	
	Public Works Department	**Capital Improvement Program**
Low	less than$41,000 (<1%)	less than $131,300 (<25%)
Medium	$41,101 – $205,000 (1%-5%)	$131,301 –$394,000 (26-75%)
High	greater than $205,001 (>5%)	greater than $394,000 (> 75%)

Note: Ranges rounded to the nearest $1,000.

Private costs identify whether or not a measure is expected to result in direct costs to property or business owners.

Supporting information describing economic costs of each measure is contained in Appendix C.

Non-quantified Measures

Non-quantified measures consist of measures whose GHG reduction potential could not be estimated at the time of plan preparation or measures that would not reduce emissions contained within the 2005 baseline inventory. GHG reduction potential could not be estimated for some measures for two reasons; a) insufficient data exists to quantify GHG reduction potential, or b) no reliable quantification methodology currently exists to calculate these reductions. The City's high standard for quantification methodologies may have resulted in the exclusion of some emissions reductions, but the standard reflects the City's desire to not over estimate the reduction potential of the CAP measures. In the

future, reliable quantification methods may be created and the City will include such reductions.

The other sub-category of non-quantified measures is measures capable of reducing emissions that are not included in the baseline inventory. These reductions therefore do not help the City achieve its 2020 emissions reduction target. These measures remain within the CAP because the City and the community recognize that these actions will reduce global GHG emissions and help protect the climate. Generalized costs to the City and identification of whether or not the measure would result in costs to Piedmont home- or business-owners are provided for all non-quantified measures.

Statewide Regulations

To implement AB 32, California lawmakers have adopted a variety of companion laws that if implemented, would reduce the generation of GHG emissions statewide, across all emissions sectors. Legislation such as Senate Bill (SB) 107 and AB 1493 establish performance standards for GHG emissions from electric utilities and motor vehicles. As the regulatory framework surrounding AB 32 grows, other future laws will help further reduce GHG emissions statewide.

The timing and synergy between State regulations and CAP measures is uncertain. However, since the CAP focuses on actions the City of Piedmont can take to reduce community-wide emissions, reductions achieved by the City's actions were determined independent from statewide reductions. The City's CAP measures can achieve the 15% reduction target without factoring in statewide regulations.

Implementation

To meet its GHG emission reduction targets, the City needs to prioritize actions; mobilize residents, business owners, and staff; and work with neighboring jurisdictions and regional agencies to create workable solutions.

Preliminary estimates indicate that full implementation of the CAP measures would cost the City approximately $456,000 per year through 2020. However, the implementation program identifies a gradual roll-out of the plan between 2010 and 2020 and beyond; thus, not all estimated costs will apply during the initial years of the work program.

To effectively implement the CAP, the City will need to identify and develop funding sources for CAP measures. Potential funding sources are described in more detail in Chapter IV.

Approach

Translating CAP measures into on-the-ground results requires tangible action steps, reliable funding, and the flexibility to change course as economic, political, and environmental conditions demand. Chapter IV outlines the specific action steps that will implement each measure for which GHG emission reductions have been quantified. The City has provided an implementation timeframe, responsible departments, and potential funding strategies for each action step. Additionally, the City has selected performance indicators and monitoring and reporting requirements that will be used to evaluate the success of each measure.

The City's Public Works Department will track and report progress toward achieving the City's GHG emission reduction target of 15% below 2005 levels by 2020. The Department will provide annual reports to the City Council on the progress made toward achieving the reduction target as a whole, and for each quantified measure. Ideally, the measures will achieve or surpass the expected GHG reductions. If they do not, the City will examine ways to increase measure performance or create new measures capable of making up for missed emission reductions.

Plan Adjustments and Flexibility

The 2010 CAP represents the City's best attempt to respond to the challenge of climate change at the time of preparation. The field of climate action planning is rapidly evolving. Over the next decade, new information, GHG reduction methods, and legislation are likely to develop. In order to remain effective, the CAP must evolve over time.

The CAP as a whole will be reviewed and modified every three years to identify potential plan update needs. These reviews will evaluate improvements to climate science, explore new opportunities for GHG reduction and climate adaptation, and respond to changes in climate policy.

Moving Forward

In order to achieve Piedmont's reduction target, the City will need every resident and business to become involved. Ultimately, the community's GHG emissions are the sum of individual actions and choices. To achieve the required reductions we all must realize our personal ability to affect change.

Climate change is often framed in terms of global treaties or technological advances, but a person's everyday actions are just as important to creating a solution. ***You*** are part of the solution if you decide to walk, bike, or take public transit as an alternative to driving, buy energy efficient appliances, insulate your home, replace incandescent light bulbs with compact fluorescent light (CFL) or Light-Emitting Diode (LED) technologies, air dry your dishes and clothes, use the cold cycle when you do the laundry, take shorter showers, adjust your thermostat, or plant a tree.

Chapter II
GHG Baseline, Projections, and Targets

This chapter presents the City's greenhouse gas (GHG) emissions inventory, establishes an emissions baseline based on the inventory, projects 2020 and 2050 emissions independent of corrective actions, and describes Piedmont's emissions reduction target. The purpose of developing a GHG emissions inventory is to assist policy makers by identifying the source types, distribution, and overall magnitude of GHG emissions to support adoption of effective reduction measures and implementation actions.

Baseline

This section describes the methods used by ICLEI – Local Governments for Sustainability (ICLEI) – to develop Piedmont's GHG emissions inventory. The City, in coordination with ICLEI, developed a GHG emissions inventory for both community-wide and government-related sources for the 2005 operational year. The inventory was compiled using ICLEI's Clean Air Climate Protection (CACP) Software. The community-wide sources within the CACP software are intended to represent the total GHG emissions occurring within the City and include sectors, such as residential, commercial, and industrial energy use; transportation; solid waste; and optional user-defined sectors. Government-related sources, which represent all City-operated buildings or vehicles, are a subset of the community-wide sources and include government buildings, vehicle fleet, solid waste, and streetlights, among others. A summary of the inventory by emission sector (e.g., transportation, waste, energy consumption) is provided and discussed below. This section concludes by discussing modifications to the inventory that were completed to establish the GHG emissions baseline.

Methodology

CACP is an emissions inventory computer program that uses activity data (e.g., energy consumption, vehicle miles traveled [VMT]) to calculate GHG emissions associated with each emission sector (e.g., energy, transportation). ICLEI used California-, Alameda County-, or Piedmont-specific activity data and emissions factors when possible, which generates a more accurate estimation of GHG emissions for the City.

Energy Consumption

The emissions inventory used electricity and natural gas use rates for residential, commercial, and industrial land uses for the year 2005 from Pacific Gas and Electric (PG&E). The energy consumption data separated private users from government-operated facilities (i.e., City owned). Due to PG&E's 15/15 Rule, discussed further below in the GHG Emissions Baseline section, energy consumption data for commercial and industrial land uses were combined together for both electricity and natural gas.

In order to calculate GHG emissions from natural gas and electricity consumption, ICLEI obtained California-specific emission coefficients from PG&E. For natural gas consumption, a 2005 PG&E-specific emission coefficient (kilograms of CO_2 per million British thermal units [kg CO_2/MMBtu]) for natural gas delivery was used within CACP for both community-wide and government-related energy use. The PG&E-specific natural gas emission coefficient used to calculate GHG emissions was verified by California Climate Action Registry (CCAR) and the California Energy Commission (CEC). Similar to natural gas consumption, a 2005 PG&E-specific emission coefficient (pounds of CO_2 per kilowatt [lbs CO_2/kWh]) was used to calculate GHG emissions associated with electricity delivery, which is also verified by CCAR. The PG&E-specific electricity emission coefficient accounts for the cleaner (i.e., less carbon intensive) electricity portfolio used by PG&E relative to the nation-wide average.

Transportation

Metropolitan Transportation Commission (MTC) and the California Department of Transportation (Caltrans) provided vehicle activity data (i.e., Vehicle Miles Traveled [VMT]) occurring on local roadways within the City limits. Alameda and Contra Costa (AC) Transit provided public transit activity data used within the community-wide analysis. The City provided detailed vehicle and VMT data for the government (i.e., City) vehicle fleet.

ICLEI used the California Air Resources Board's (ARB) Emission Factors model (EMFAC2007) to obtain Alameda County-specific emission coefficients for vehicle fuel distribution, vehicle fuel efficiencies, and emission factors. Alameda County-specific emissions factors data (EMFAC2007) was only used for community-wide transportation data. The City provided municipal vehicle fleet data with specific information regarding fuel and vehicle types. ICLEI also used EMFAC2007 assumptions to generate emission factors for the City vehicle fleet.

Solid Waste

The California Integrated Waste Management Board (CIWMB) provided solid waste disposal data. Alameda County-specific waste categorization percentages were obtained from the Alameda County Waste Characterization Study 2000 (Alameda County Waste Management Authority 2000). Due to the differences in the Alameda County Waste Characterization Study's waste categories and the categories contained within CACP, the Waste Characterization Study categories were combined to better match CACP categories. For example, waste categories from the Alameda County Waste Characterization Study such as plastic, glass, metals, and other waste were combined together to account for an "all other

waste" category within CACP. For government-related waste categories, standard state waste percentages from CIWMB were used.

CACP provides GHG emission coefficients for various solid waste categories. These national default emission coefficients were used to calculate GHG emissions associated with solid waste disposal. The only alteration made to these emission coefficients was to set all waste category sequestration rates to zero in order to avoid the City taking credit for downstream emissions sequestration without also accounting for upstream emissions associated with production, transport, and consumption.

GHG Emissions Inventory by Sector

CACP separates the GHG emissions inventory into community-wide and government-related emissions. Community-wide emissions represent the total GHG emissions originating from activity within each sector throughout the community. Government-related emissions, although separated in CACP, are considered a sub-set of the community-wide (i.e., total) GHG emissions. Table II-1 presents Piedmont's 2005 community-wide GHG emissions and the percent contribution of each emissions sector. As shown below, electricity and natural gas consumption within buildings (i.e., residential, commercial, and industrial) contributed approximately 54% of Piedmont's community-wide GHG emissions. GHG emissions associated with residential energy use are approximately 95% of Piedmont's energy-related GHG emissions. Transportation-related activities contributed approximately 41% of Piedmont's annual GHG emissions. Waste disposal contributed approximately 5% of Piedmont's annual GHG emissions.

Table II-1
2005 Community-wide GHG Emissions and Percent Contributions

Community Sector	GHG Emissions	
	Metric Tons CO_2e	Percent
Residential Energy Use	24,034	51%
Commercial/Industrial Energy Use	1,389	3%
Transportation	19,094	41%
Waste	2,153	5%
Total	**46,670**	**100%**

Source: Data compiled by AECOM 2008 from ICLEI's CACP inventories.
na = source not included in the inventory
Notes: CO_2e represents carbon dioxide equivalent, which accounts for the global warming potential of GHG emissions, such as methane (CH_4) and nitrous oxide (N_2O). Percent contribution is the percent contribution of a particular source to the total inventory. Percents may not add up to 100% because of rounding to the nearest whole percent.

Table II-2 presents government-related GHG emissions and the percent contribution of each emission sector. More than 75% of government-related GHG emissions are generated from energy consumption for buildings. The City has the ability to control government-operated building energy consumption

through retrofits and new building standards (e.g., California Green Building Standards Code). However, the total government-related GHG emissions represent only 2% of the City's community-wide GHG emissions.

Table II-2
Government-Related GHG Emissions and Percent Contributions

Community Sector	GHG Emissions	
	Metric Tons CO_2e	Percent
Buildings	786	76%
Vehicle Fleet	181	18%
Waste	65	6%
Total	**1,031**	**100%**

Source: Data compiled by AECOM 2008 from ICLEI's CACP inventories.
Values may not appear to add exactly due to rounding.
na = source not included in the inventory
Notes: CO_2e represents carbon dioxide equivalent, which accounts for the global warming potential of GHG emissions, such as methane (CH_4) and nitrous oxide (N_2O). Percent contribution is the percent contribution of a particular source to the total inventory.

Emissions Baseline

To refine the 2005 emissions inventory to establish an effective baseline for the Climate Action Plan (CAP), the City requested that AECOM conduct a peer review of the inventory. This effort resulted in modifications to the 2005 GHG emissions inventory to add water consumption energy use and separate commercial and industrial natural gas use. Table II-3 identifies the City's GHG emissions baseline for the year 2005. For purposes of the CAP, Piedmont's reduction target of 15% below baseline emissions by 2020 applies to these baseline emissions shown in Table II-3, which include the government-related emissions presented in Table II-2.

Table II-3
2005 Community-Wide GHG Emissions and Percent Contributions

Community Sector	GHG Emissions	
	Metric Tons CO_2e	Percent
Residential Energy Use	24,034	50%
Commercial/Industrial Energy Use	1,389	3%
Transportation	19,094	40%
Waste	2,153	5%
Water	1,084	2%
Total	**47,754**	**100%**

Source: Data compiled by AECOM 2008 from ICLEI's original and final inventories.
na = source not included in the inventory
Notes: CO_2e represents carbon dioxide equivalent, which accounts for the global warming potential of GHG emissions, such as methane (CH_4) and nitrous oxide (N_2O). Percent contribution is the percent contribution of a particular source to the total inventory.

Energy Consumption

As mentioned above, PG&E provided energy use (i.e., electricity and natural gas) data for both community-wide and government-related operations. Based on PG&E's 15/15 Rule, any aggregated information provided by the utilities must be made up of at least 15 customers and a single customer's load must be less than 15% of an assigned category. If the number of customers is below 15, or if a single customer's load is more than 15%, PG&E must combine certain data categories (e.g., commercial and industrial) prior to releasing the data in order to protect the privacy of individual users. The 15/15 Rule was triggered for both electricity and natural gas consumption data provided to the City. Thus, PG&E aggregated both commercial and industrial energy consumption as a single sector.

The lack of detailed information resulting from the 15/15 Rule limits the ability of planners and decision-makers to target major energy use sector contributors. The Bay Area Air Quality Management District's (BAAQMD's) GHG inventory includes commercial and industrial sources as an aggregated emissions sector. However, BAAQMD staff provided information to support separating natural gas consumption for commercial and industrial uses (Tholen, pers. comm., 2009). Electricity consumption for both commercial and industrial uses was aggregated as a single source. This issue should be addressed for future GHG inventories in order to provide more detailed information that can be effectively used to target emission sources and quantify emission reductions from on-site GHG emissions control strategies.

Water Consumption

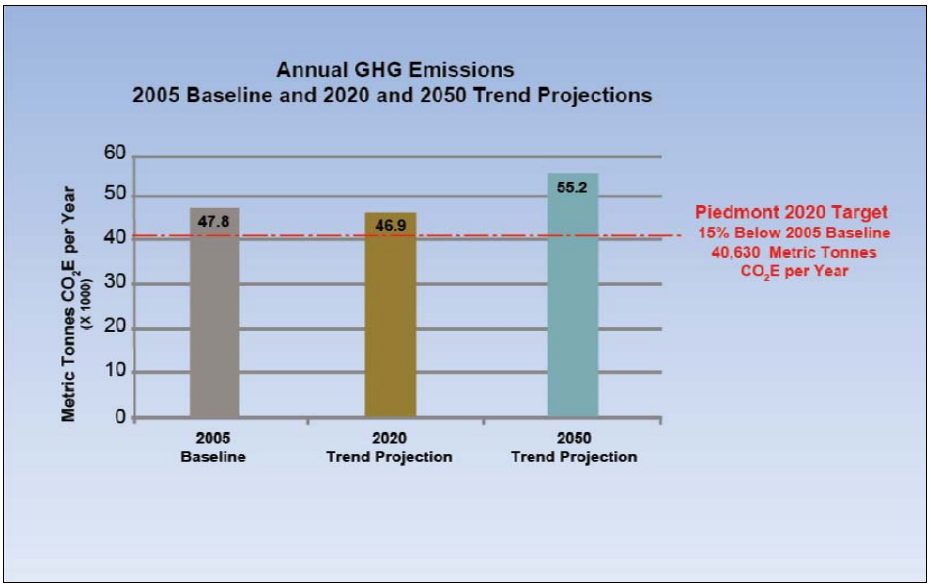
Energy use associated with water consumption accounts for approximately 20% of California's total energy use (CEC 2006). However, the 2005 GHG inventory did not include emissions associated with water consumption. In order to more accurately portray existing conditions, water-related GHG emissions in Piedmont were added to the 2005 baseline. The East Bay Municipal Utility District (EBMUD) provided historical water consumption data (1976-2008) for Piedmont. The 2005 water consumption data were used to calculate the City's GHG emissions associated with water consumption.

CEC has estimated the level of electricity use associated with water supply and conveyance, water pre-treatment, water distribution, and wastewater treatment in both Northern and Southern California (CEC 2006). Assumptions used to estimate water-related electricity consumption for Piedmont are specific to Northern California. CCAR's *General Reporting Protocol* Version 3.1 GHG emission factors for electricity use were then used to calculate metric tons of carbon dioxide equivalent (MTCO2e) associated with water-related electricity use. As discussed above, residential and commercial/industrial GHG emissions associated with energy consumption were calculated using PG&E-specific assumptions. However, due to the range of utility providers potentially engaged in the water delivery process, California statewide-average GHG emission assumptions were used to project emissions associated with water-related energy consumption in Piedmont.

Projections

To determine the GHG emission reductions necessary to achieve Piedmont's target (i.e., 15% reduction in emissions relative to 2005 emission levels by 2020), the City's GHG emissions were projected for the years 2020 and 2050 under a trend scenario assuming that historical data and trends would be representative of future year consumption rates for energy, water, and waste. The City recognizes the 2050 goal (i.e., 80% below 1990 levels) established by Executive Order S-03-05. However, due to the uncertainty of projecting 2050 activity and emission levels, this CAP focuses on the 2020 goal. As 2020 approaches, the City will reevaluate its GHG reduction target to better represent progress toward the 2050 goal.

In the short term, transportation emissions are expected to decrease because of lower emissions from newer vehicles. These decreased emissions would likely outweigh expected increases in VMT. However, in the long term, projected increases in VMT outweigh decreased vehicle emissions resulting from improved fuel efficiency. Therefore, assuming that the same type of current emissions-generating practices continue to occur within Piedmont, the City's GHG emissions would be anticipated to decrease from 47,754 $MTCO_2e$ in 2005 to 46,944 $MTCO_2e$ in 2020, and 55,240 $MTCO_2e$ in 2050. This represents a 1.7% decrease and 16% increase over the 2005 baseline level, in 2020 and 2050, respectively. In comparison, the City's projected population is expected to increase 2% by 2050 from 2005 based on a linear extrapolation from the City's 2008 population. Therefore, if current emissions-generating practices continue, Piedmont's GHG emissions are expected to increase at a higher rate than its population in 2050. This trend can be explained by increases in per capita activity levels (i.e., energy consumption, waste disposal, water consumption, and vehicle miles traveled).



A description of the methods and sources of information used to project the City's 2020 and 2050 GHG emissions for each end-use sector (e.g., energy, transportation, waste, water) is provided below. All GHG emissions have been calculated in $MTCO_2e$, which accounts for the global warming potential (GWP) of nitrous oxide (N_2O) and methane (CH_4). A summary of Piedmont's GHG emissions for the baseline year (2005), 2020, and 2050 is shown below in Table II-4.

Table II4
Piedmont GHG Baseline (2005) and Projected 2020 and 2050 Emissions

Emissions Sector	2005 Baseline $MTCO_2e$ (Percent of Total Emissions)	2020 Projected $MTCO_2e$ (Percent of Total Emissions)	2050 Projected $MTCO_2e$ (Percent of Total Emissions)
Residential – Natural Gas	16,869 (35.3%)	17,426 (37.1%)	18,907 (34.2%)
Residential – Electricity	7,166 (15.0%)	7,794 (16.6%)	9,315 (16.9%)
Subtotal Residential	*24,034 (50.3%)*	*25,221 (53.7%)*	*28,222 (51.1%)*
Commercial – Natural Gas	306 (0.6%)	320 (0.7%)	357 (0.6%)
Industrial – Natural Gas	151 (0.3%)	164 (0.3%)	198 (0.4%)
Commercial/Industrial – Electricity	933 (2.0%)	1,035 (2.2%)	1,336 (2.4%)
Subtotal Commercial/Industrial	*1,389 (2.9%)*	*1,519 (3.2%)*	*1,891 (3.4%)*
Transportation	19,094 (40.0%)	18,365 (39.1%)	23,773 (43.0%)
Waste	2,153 (4.5%)	777 (1.7%)	—[1]
Water	1,084 (2.3%)	1,062 (2.3%)	1,353 (2.4%)
Total	**47,754**	**46,944**	**55,240**

Sources: ICLEI 2008; AECOM 2009.

Notes: Totals may not appear to add exactly due to rounding.

[1] The 2050 solid waste sector has been omitted due to the uncertainty and unavailability of future data.

$MTCO_2e$ = metric tons carbon dioxide equivalent

Energy

As shown above in Table II-4, the GHG emissions associated with residential energy use in Piedmont (i.e., electricity and natural gas) are projected to increase by 1,187 $MTCO_2e$ in 2020 and 4,188 $MTCO_2e$ in 2050, a 5% and 17% net increase from baseline (2005) levels, respectively. GHG emissions associated with commercial/industrial energy use in Piedmont are projected to increase by 130 $MTCO_2e$ in 2020 and 502 $MTCO_2e$ in 2050; a 9% and 36% net increase from baseline levels.

To estimate GHG emissions associated with energy consumption in Piedmont in 2020 and 2050, an annual average growth rate was applied to baseline (2005)

electricity and natural gas consumption rates. The U.S. Department of Energy (DOE) Energy Information Administration (EIA) publishes an annual Energy Outlook Report that forecasts electricity and natural gas consumption by land use type (i.e., residential, commercial, and industrial) for regions throughout the U.S. For Piedmont's 2020 and 2050 energy projections, the Pacific region forecasts from the 2009 Annual Energy Outlook were used to calculate the annual average growth rate in electricity consumption for residential, commercial, and industrial land uses (EIA 2009). The EIA annual average growth rate for natural gas use was determined not to be representative of growth of Piedmont due to the built-out nature of the City. Therefore, an annual average growth rate for natural gas use was calculated using historical PG&E natural gas demand from 1990 to 2004. Table II-5 presents the annual average growth rates for land uses and energy sources between 2007-2020 and 2007-2030 provided by EIA and PG&E.

Table II-5
Summary of Energy Consumption Growth Rates

Sector – Energy Source	Average Annual Growth Rate (2007-2020) [1]	Average Annual Growth Rate (2007-2030) [2]
Residential – Natural Gas [3]	0.27%	0.27%
Residential – Electricity	0.60%	0.60%
Commercial – Natural Gas [3]	0.37%	0.37%
Commercial – Electricity	0.92%	0.91%
Industrial –Natural Gas [3]	0.63%	0.63%
Industrial – Electricity	0.54%	0.72%
Average Commercial/Industrial – Electricity [4]	0.73%	0.81%
Transportation – Vehicle Miles Traveled [3]	0.72%	0.72%
Water Consumption – Gallons Consumed [3]	0.81%	0.81%

Source: CEC 2009; Caltrans 2008; EBMUD 2008; EIA 2009.

[1] 2007-2020 average annual growth rates are used within the 2020 GHG projections.

[2] 2007-2030 average annual growth rates are used within the 2050 GHG projections.

[3] The same annual average growth was used to project 2020 and 2050 activities.

[4] Average commercial/industrial electricity growth rates are used to project commercial and industrial electricity use to account for limitations in the 2005 baseline relative to PG&E's 15/15 Rule.

Baseline year (2005) emissions calculations were based on PG&E-specific emission factors for both electricity and natural gas consumption. Although electricity, and to a lesser extent, natural gas delivery emission factors would be anticipated to decrease with time and improved technology, these factors represent the most accurate emission factors available describing Piedmont's future energy consumption trends.

Transportation

As shown in Table II-4, Piedmont's transportation-related GHG emissions are expected to decrease by 729 $MTCO_2e$ by 2020 and increase by 4,679 $MTCO_2e$ by 2050, a 4% net decrease and 25% net increase relative to the baseline level, respectively. The projected decrease in 2020 transportation-related emissions can be attributed to the lower emission rates from newer vehicles. In 2020, decreased emissions from individual vehicles would likely outweigh expected increases in VMT. However, in 2050, the increase in transportation-related emissions occurs largely because projected increases in VMT outweigh decreased vehicle emissions resulting from improved fuel efficiency.

Piedmont's mobile source transportation activity in 2020 and 2050 was projected using historical Piedmont-specific VMT data from Caltrans (Caltrans 2007). Based on historical VMT data on local public roads from 2001 to 2007, an annual average VMT growth rate of 0.7% was applied to the baseline 2005 VMT data to project Piedmont's 2020 and 2050 VMT.

An Alameda County-specific emission factor for gasoline and diesel fuel from EMFAC 2007 was used to calculate 2020 and 2050 projected CO_2 emissions associated with projected VMT in Piedmont. Forecasted Alameda County population, VMT, and fuel consumption data for 2020 and 2050 by vehicle class were used to calculate weighted-average fuel efficiencies (i.e., miles per gallon) for both gasoline- and diesel-fueled vehicles. The projected VMT data was then divided by the weighted-average fuel efficiencies to calculate gallons of gasoline and diesel fuel consumed. The total gallons of gasoline and diesel fuel consumed were multiplied by the EMFAC2007 emission factors to calculate CO_2 emissions.

CCAR's *General Reporting Protocol* Version 3.1 provides N_2O and CH_4 emission factors for gasoline- and diesel-fueled vehicles by vehicle class (CCAR 2009). These emission factors were weighed using Alameda County-specific vehicle class population and distribution information, then multiplied by projected 2020 and 2050 VMT, respectively, to calculate N_2O and CH_4 emissions. The N_2O and CH_4 emissions were then weighted by their GWP and added to CO_2 emissions to obtain $MTCO_2e$.

Waste

As shown in Table II-4, Piedmont's waste-related GHG emissions are expected to decrease by 1,376 $MTCO_2e$ by 2020, a 64% net decrease relative to the 2005 baseline. City waste disposal data was used to project Piedmont's 2020 solid waste disposal needs. The City has established a goal to reduce the amount of solid waste disposed from 1990 levels by 75% in 2010. The Alameda County Waste Management Authority and Source Reduction and Recycling Board (operating together as StopWaste.org) provided solid waste disposal data (i.e., tons of solid waste entering landfills) for multiple benchmark years, which were used to interpolate solid waste disposal in the City in 2020.

CACP was used to quantify GHG emissions associated with 2020 solid waste disposal levels using nationally averaged emission factors for various types of waste. The projected GHG emissions were calculated assuming the same

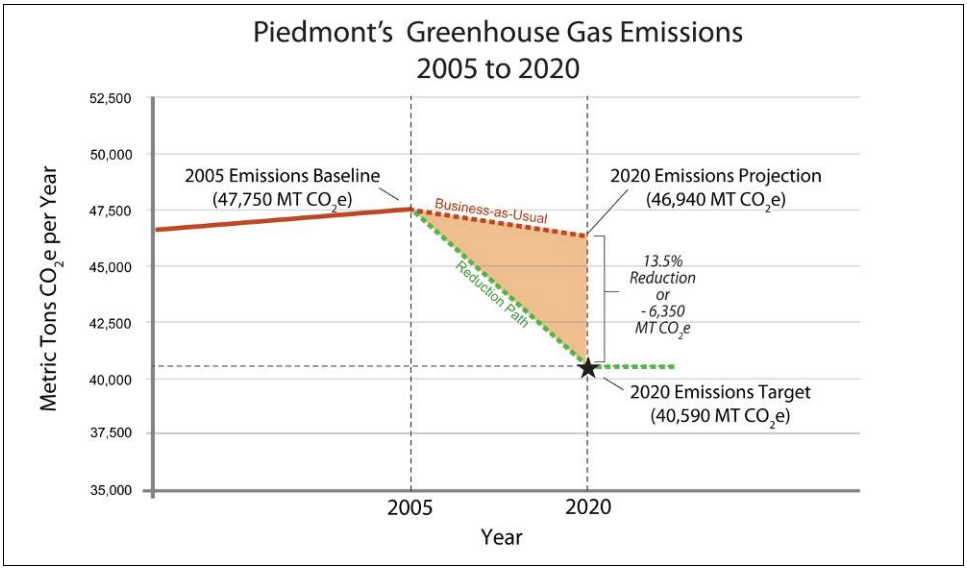
percent distributions for solid waste disposal categories as used in the baseline inventory.

Water Consumption

As discussed above, EBMUD provided historical water consumption data (1976-2008) for Piedmont. Given the variability of annual water consumption growth rates during this period, water consumption for 2020 and 2050 was projected using the annual average water consumption growth rate from 1990-2008 in Piedmont. Table II-5 shows the annual average growth rate used to project the City's 2020 and 2050 water consumption.

GHG Emissions Reduction Target

The City has adopted a GHG emissions reduction target of 15% below baseline year (2005) emission levels by 2020. The City places emphasis on creating an attainable reduction target. The target represents the City's estimate of an achievable level of GHG reduction given Piedmont's specific land use setting and location. The target was established by evaluating the emissions reduction potential of a wide range of land use, transportation, energy, waste and water related measures. Piedmont would have difficulty achieving a reduction of more than 15% below 2005 levels by 2020, due to its built-out residential land use pattern, hilly topography, and other factors. The City's target is consistent with the AB 32 Scoping Plan's recommended minimum reduction levels for local government municipal and community-wide emissions (15% below 2005 emission levels by 2020).



To achieve the adopted target, Piedmont will need to reduce community-wide GHG emissions to approximately 40,590 MT CO_2e per year by 2020. This represents a 13.5% reduction (or 6,353 MT CO_2e) from projected 2020 GHG emissions levels, which take into account population growth and continued consumption. Chapter III identifies GHG reduction measures capable of achieving this target, and describes the relationship of Piedmont's local actions to statewide efforts to curb GHG emissions.

Chapter III
Climate Action Strategies

Strategies

The City of Piedmont has established a goal to reduce community-wide greenhouse gas (GHG) emissions to 15% below 2005 baseline levels by 2020. This Chapter describes the three strategies that Piedmont has crafted to achieve this target. Combined, these strategies will decrease GHG emissions by approximately 9,980 metric tons of carbon dioxide equivalent (MT CO_2e), enabling the community to contribute to global efforts to combat climate change. Piedmont's Climate Action Plan (CAP) strategies include the following:

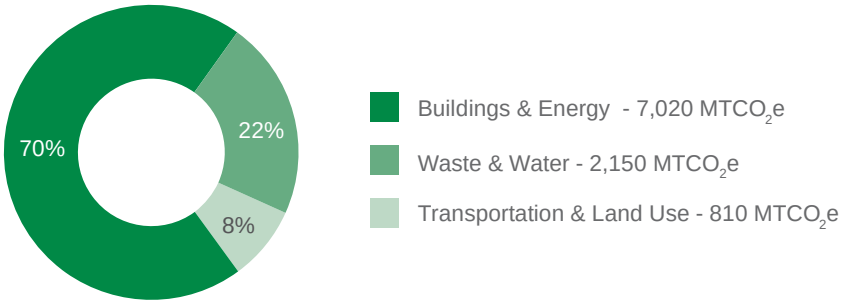
Buildings and Energy: Minimize energy consumption; create high-performance buildings, and transition to clean, renewable energy sources. The buildings and energy strategy recommends energy efficiency retrofits for existing buildings, enhances energy performance requirements for new construction, increases use of renewable energy, and improves community energy management.

Waste and Water: Minimize waste and celebrate water as an essential community resource. The waste and water strategy builds on past City successes by increasing waste diversion rates and recommending water conservation measures applicable to both indoor and outdoor water use.

Transportation and Land Use: **Create an interconnected transportation system and land use pattern that shifts travel from personal automobiles to walking, biking, and public transit.** The transportation and land use strategy identifies ways to reduce automobile emissions, including improving pedestrian and bicycle infrastructure, enhancing public transit service, and improving the City's vehicle fleet.

The GHG Reduction Potential of CAP Strategies and Objectives

All three strategies provide essential GHG reductions that in combination reduce GHGs by approximately 9,980 MT CO_2e (or nearly 21% below 2005 levels), creating the potential for the City to exceed its established 2020 reduction target (15% below 2005 baseline emission levels by 2020). Each strategy contains a series of objectives, measures, and actions. The GHG reduction potential of the strategies and their component objectives are described below. While the strategies are separated into distinct categories for organizational purposes, many synergies exist between them. The CAP will be most successful if these relationships are recognized.



Buildings and Energy Strategy

The Buildings and Energy Strategy reduces approximately 7,020 MT CO_2e of GHG emissions, representing 70% of the CAP's total reduction capacity. Energy efficiency retrofits and renewable energy generation provide the most reductions within this strategy. The majority of Piedmont's residential buildings were built more than 30 years ago, prior to the adoption of California's energy efficiency standards. Considerable opportunity exists to reduce energy consumption in these structures (Table III-1). Piedmont also has high potential to support solar energy systems. Installing photovoltaic panels and solar hot water heating systems has the potential to further reduce GHG emissions.

Table III-1
Buildings and Energy Strategy

Objective	GHG Reduction Potential (MT CO_2e)	Percentage of Strategy
BE-1: Reduce Energy Use in City Facilities	920	13%
BE-2: Consider Retrofitting Existing Residential Buildings	4,260	61%
BE-3: Consider Retrofitting Existing Commercial Buildings	40	1%
BE-4: Consider Requiring Energy Performance in New Construction	20	< 1%
BE-5: Maximize Use of Renewable Energy	1,620	23%
BE-6: Community Energy Management	160	2%
Total Buildings and Energy Strategy	**7,020**	**100%**

Waste and Water Strategy

The Waste and Water Strategy provides the second largest amount of emission reductions. By 2020, this strategy would reduce approximately 2,150 MT CO_2e of GHG emissions, or about 22% of the overall CAP reductions (Table III-2). For the last two decades, the City has been a leader in minimizing waste. The CAP proposes that the City increase its waste diversion rate target (90% diversion by 2030). This level of waste reduction and diversion would provide considerable GHG reductions. Increasing water conservation also provides multiple benefits to the community beyond GHG reductions.

Table III-2
Waste and Water Strategy

Objective	GHG Reduction Potential (MT CO_2e)	Percentage of Strategy
WW-1: Become a Zero Waste Community	1,380	64%
WW-2: Conserve Water Resources	770	36%
Total Waste and Water Strategy	**2,150**	**100%**

Transportation and Land Use Strategy

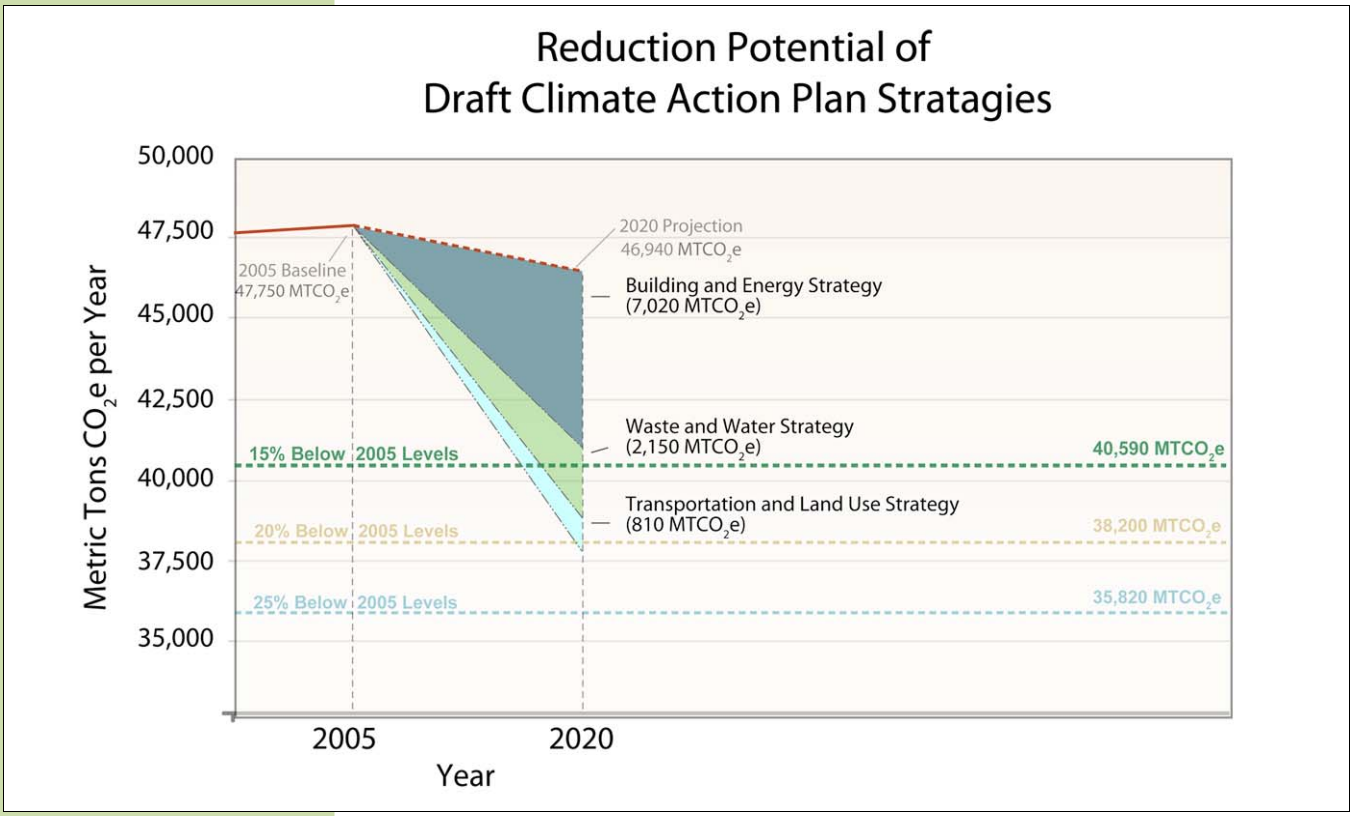
The Transportation and Land Use Strategy reduces approximately 810 MTCO_2e of GHG emissions, providing about 8% of the community's total emission reductions (Table III-3). Improving pedestrian and bicycle infrastructure will provide the largest reductions. Improving public transit and facilitating a limited amount of mixed-use, pedestrian-oriented development will contribute further reductions.

Table III-3
Transportation and Land Use Strategy

Objective	GHG Reduction Potential (MT CO_2e)	Percentage of Strategy
TL-1: Facilitate Walking and Biking	690	86%
TL-2: Make Public Transit More User Friendly	70	8%
TL-3: Reduce Vehicle Emission and Trips	50	6%
Total Transportation and Land Use Strategy	**810**	**100%**

Relationship to Statewide Emission Reductions

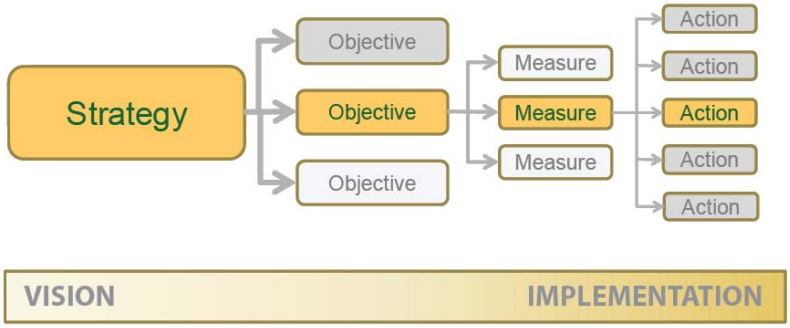
The City's CAP strategies are expected to achieve the 2020 target exclusive of statewide reductions mandated through legislation such as Senate Bill (SB) 107 or Assembly Bill (AB) 1493. The City selected this approach to avoid potential double-counting of City and State GHG emission reductions. A more detailed discussion of this approach is described at the end of this chapter.



Structure of the Strategy Chapter

Preparing and adopting the CAP represents an early step toward achieving the City's GHG reduction target. To attain the target, the CAP must guide and facilitate change throughout the community. Each strategy contains *objectives*, *measures,* and *actions* that translate the CAP's vision into on-the-ground implementation. Objectives serve to refine the strategies into specific focus areas. Measures constitute one of the most important parts of the CAP as they define the direction that the City will take to accomplish its GHG reduction goals. Actions, in turn, define the specific steps that City staff and decision-makers will implement over time.

Piedmont Climate Action Policy Structure



This chapter is divided into four sections. The first three sections describe the Building and Energy, Waste and Water, Transportation and Land Use strategies, respectively. The final section describes the potential effect of statewide legislation on community emissions and how this relates to the City's reduction efforts.

Each strategy section provides a brief overview of that strategy's role in curbing the community's emissions and a background discussion describing how Piedmont's context relates to the objectives and measures. Following this discussion, objectives and measures are presented.

Measures describe both the City's policy direction and needed action steps. Additionally, the measure descriptions provide a tabular summary of GHG reduction potential, generalized costs to the City, and identification of whether or not the measure would result in costs to Piedmont home- or business-owners.

Values within the *GHG Reduction Potential* column of the tabular summary refer to the estimated annual GHG emission reductions in 2020 in MT CO_2e. The *Cost to City* column uses a ranking of low, medium, and high based on a proportional share of the City's Capital Improvement Program (CIP) or the Public Works Department budget, depending on which budget would provide funding for the measure. Table III-4 below shows the range in dollars for each corresponding to low, medium, and high rankings.

Table III-4
Average Annual Cost Range of CAP Measures

	Average Annual Cost	
	Public Works Department	**Capital Improvement Program**
Low	less than$41,000 (<1%)	less than $131,300 (<25%)
Medium	$41,101 – $205,000 (1%-5%)	$131,301 – $394,000 (26-75%)
High	greater than $205,001 (>5%)	greater than $394,000 (> 75%)

Note: Ranges rounded to the nearest $1,000.

The *Private Cost* column identifies whether or not the measure is expected to result in direct costs to property or business owners.

Supporting information describing how GHG reduction estimates were calculated is provided in Appendix A. While actions are described in narrative form within the measure descriptions, detailed discussion of subsequent actions, responsible departments, and implementation schedules are provided for measures providing quantified GHG reductions in Chapter IV – CAP Implementation.

Selection of Measures and Action Steps

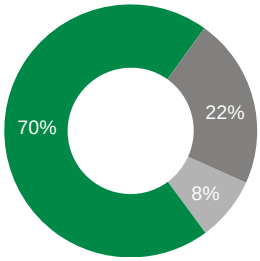
Achieving the City's GHG reduction target will require considerable changes within the community over the next decade. Piedmont will need to increase both energy and water use efficiency, develop renewable energy systems, reduce waste, and improve alternative transportation infrastructure. To ensure this transformation is realized, the CAP contains measures and action steps that are ambitious, yet attainable.

The climate action objectives and measures were developed by a) evaluating existing community conditions, b) identifying GHG reduction opportunities within the City, including those identified by Piedmont's Environmental Task Force, c) considering suggestions from the local community through public meetings and General Plan and Climate Action Plan surveys, d) reviewing best practices from leading cities and organizations, and e) incorporating State and regional laws, guidelines, and recommendations.

After considering a wide range of potential measures, City staff and the Environmental Task Force recommended the proposed measures based on the following criteria: GHG emissions reduction potential, likely cost, feasibility, and ability to create community co-benefits. While the measures contained in the CAP represent the City's best attempt to reduce GHG emissions in an effective manner, the Council will consider other actions that may be required if necessary to insure that the City ultimately meets its GHG reduction target.

Buildings and Energy Strategy

Minimize energy consumption, create high performance buildings, and transition to clean, renewable energy sources.

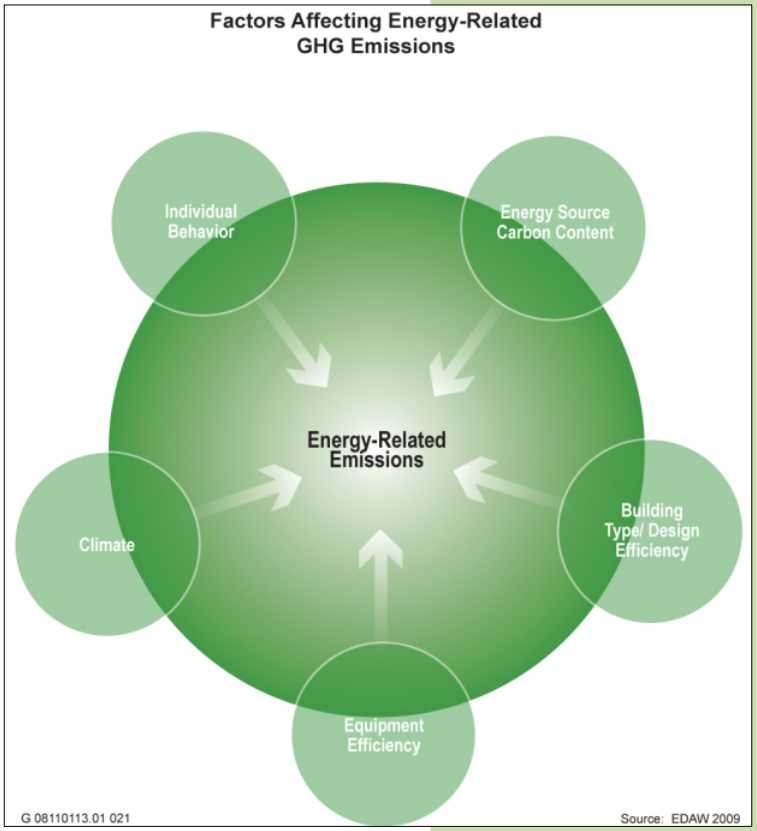


Total GHG Emissions Reduced:
7,020 Metric Tons

Objectives:
- BE-1: Reduce Energy Use in City Buildings - 13%
- BE-2: Consider Retrofitting Existing Residential Buildings - 61%
- BE-3: Consider Retrofitting Existing Commercial Buildings - 1%
- BE-4: Consider Requiring Energy Performance in New Construction - 1%
- BE-5: Maximize Use of Renewable Energy - 23%
- BE-6: Community Energy Management - 2%

The Building and Energy Strategy is expected to achieve 70% of Piedmont's total GHG emissions reductions. The proposed residential energy efficiency retrofit measure will provide annual reductions of approximately 4,260 MT CO_2e, which represents nearly 43% of the City's total anticipated GHG reductions, and about 60% of the expected reductions within the Buildings and Energy strategy. Installation of solar energy systems is expected to reduce an additional 920 MT CO_2e, representing nearly 10% of the City's total anticipated GHG reductions, and about 23% of the reductions within this strategy. While the success of the City's CAP relies on the accomplishment of all its measures, the residential retrofit and renewable energy measures represent nearly three-quarters of the anticipated reductions, and thus play particularly important roles. Both measures rely on substantial levels of participation by City's homeowners, relying in part on financial assistance from the City through an AB 811

renewable finance program. Ensuring sufficient participation from the City's residents is essential to achieving the 2020 reduction target.



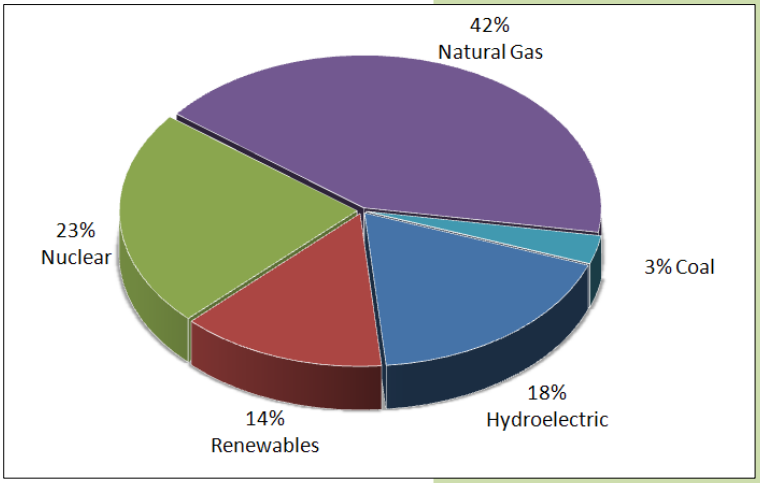
Natural gas and electricity are the two main forms of energy used within residences, businesses, and civic operations in Piedmont. In the Bay Area, natural gas is the primary energy source used to heat buildings, heat water, and cook. Though the carbon content of natural gas is lower than many other fossil fuels, its combustion releases considerable amounts of GHGs. Electricity used in Piedmont is produced at a wide variety of power generation facilities. Natural gas and coal fired power plants provide approximately half of Piedmont's electricity supply.

The Buildings and Energy strategy provides diverse measures aimed at reducing energy consumption and reliance on fossil fuel energy sources. Successful energy efficiency improvements will allow residents, business owners, and the City to considerably reduce energy consumption within both buildings and operations. Increasing renewable energy generation within the community will provide a local source of clean energy and will reduce the need for fossil fuel-fired power generation. In addition to reducing GHG emissions, these measures can also lower energy bills, increase building comfort, and reduce vulnerability to energy price fluctuations.

Background

Energy Source – *Piedmont's current energy portfolio.*

Pacific Gas and Electric (PG&E) is Piedmont's energy utility, providing both natural gas and electricity for residential, commercial, industrial, and municipal uses. PG&E generates electricity at hydroelectric, nuclear, renewable, natural gas, and coal facilities. Hydroelectric operations provide 18% of the total supply. Other types of renewable energy facilities including solar, geothermal, and biomass provide 14%, nuclear plants provide 23%, natural gas facilities provide 42% and coal provides three percent. In 2007, 55% of the community's electricity was GHG-free (Silverman 2007).



Under the provisions of Senate Bill (SB) 107, investor-owned utilities will be required to generate 20% of their retail electricity using qualified renewable energy technologies by the end of 2010. In compliance with this mandate, PG&E will expand its renewable generation portfolio from 14% to at least 20%, and additional GHG-free electricity will be available to customers in Piedmont. For more details see the Statewide reductions discussion at the end of this chapter.

Building Stock– *The age and characteristics of Piedmont's homes and non-residential buildings.*

In 1978 the State of California established a set of energy efficiency standards for residential and nonresidential buildings. These standards, referred to as Title-24, are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. As a result of these standards, homes built within the last decade are approximately 4.5 times more efficient per square foot than homes built prior to 1960. For this reason the age of a community's building stock has important implications for building energy consumption and GHG emissions.

Residential Building Stock

Almost all (99%) of Piedmont's residential housing stock was constructed prior to implementation of Title 24 Standards (Table III-5). Seventy one percent of Piedmont's housing was constructed prior to 1939. Homes of this vintage frequently have minimal insulation, antiquated furnace systems, single-pane windows, and gaps in the building envelope. While a portion of the City's housing stock has been retrofitted over time to include energy efficiency improvements, a high level of energy savings can still be achieved in the majority of Piedmont homes.

Table III-5
Age of Piedmont Housing Stock

Construction Period	Number	% of Total
Built 1999 to 2000	0	0%
Built 1995 to 1998	0	0%
Built 1990 to 1994	0	0%
Built 1980 to 1989	31	1%
Built 1970 to 1979	93	2%
Built 1960 to 1969	198	5%
Built 1950 to 1959	488	13%
Built 1940 to 1949	327	8%
Built Pre 1940	2,722	71%
Total	**3,859**	**100%**

Source: U.S. Census 2000; AECOM 2009.

Home Size

Homes in Piedmont are, on average, considerably larger than in other nearby communities (Table III-6). These larger homes frequently use more energy, as the additional space requires additional heating and cooling energy as well as additional energy consumed for lighting and appliances.

Table III-6 Average Home Size In Alameda County Jurisdictions	
City	**Average Home Size in Square Feet**
Piedmont	2,560
Berkeley	1,670
Alameda	1,650
Livermore	1,815

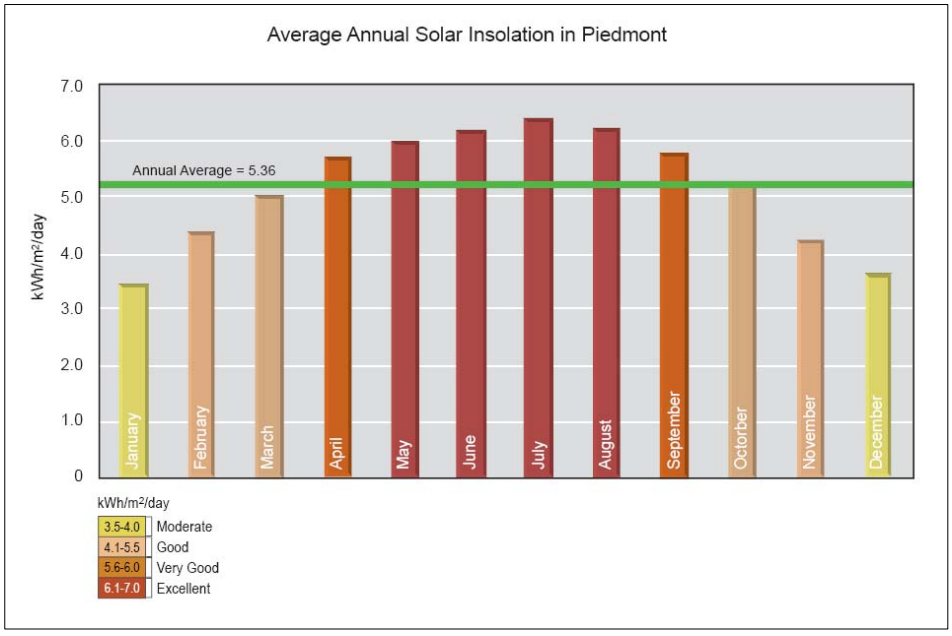
Source: Parcel Quest 2009; City of Piedmont, 2009.

Renewable energy – *The potential for renewable energy generation within the community.*

Renewable energy can be produced using distributed generation facilities, such as rooftop solar systems, or can be purchased through the utility grid from remote generation facilities. Presently, approximately 50 buildings have existing solar photovoltaic or solar hot water heater systems. No wind turbines are known to exist within the city. As stated above, in 2007 about 13% of PG&E's grid portfolio came from renewable sources (exclusive of major hydroelectric facilities), and with implementation of SB 107, this will increase to 20% by 2011. Increasing local renewable energy generation and grid content will reduce considerable amounts of GHG emissions in the community.

Solar Energy Potential

Solar energy represents the most promising option for future renewable energy generation in Piedmont. Piedmont receives enough energy from the sun to produce an average of 5.36 kilowatts hours (kWh) per square meter per day (NREL 2002). This level of insolation suggests a high potential for both photovoltaic and solar hot water heating systems in the City. Insolation levels fluctuate between summer and winter, however during the majority of the year, solar energy generation is considered good to excellent. December and January have moderate, but still acceptable, potential for solar energy generation.



Other Renewable Energy Sources

Potential for wind energy generation in Piedmont is low. Other renewable technologies such as biomass, geothermal, and micro-hydro-generation are also not likely to be practical within the City. Thus, these methods have not been considered within the CAP.

Building and Energy Objectives and Measures

Objective BE-1:

Reduce Energy Use in City Facilities

The City of Piedmont has the opportunity to serve as an example to the rest of the community by transitioning to more energy-efficient municipal buildings. The following measures work together to reduce energy demand, improve energy efficiency, and incorporate renewable generation technologies within City buildings.

Measure BE-1.1	**Install cost-effective renewable energy systems on all City buildings and purchase remaining electricity from renewable sources.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
920	Low	No

The City will conduct energy efficiency audits of all municipal buildings and explore the potential to locate renewable energy systems on City properties. The City will implement cost effective efficiency improvements and renewable energy investments. Remaining energy needs will be met through purchases of renewable and preferably local energy sources.

Measure BE-1.2	**Install building performance data (energy and water) displays in all City public buildings.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Included within BE-1.1	Low	No

The City will install electronic building performance displays in each publicly accessible building. The displays will provide building managers, employees, and visitors with easy-to-understand information on electricity, gas, and water use. Over time, this information will facilitate effective use of energy and water in municipal operations.

Objective BE-2:

Consider Retrofitting Existing Residential Buildings

Improving the energy efficiency of Piedmont's existing housing stock represents a major opportunity for the community. Efficiency retrofits will reduce approximately 4,260 MT of GHG emissions, while also reducing home energy bills and increasing comfort for occupants.

To maximize the number of residential energy efficiency improvements, the CAP establishes a comprehensive program that will educate homeowners about the benefits of efficiency upgrades, encourage home energy audits, provide financial incentives to complete energy efficiency improvements, and require or facilitate point-of-sale improvements.

The City envisions that educational programs, home audits, and financial incentives will motivate the majority of homeowners to make the necessary improvements. If necessary, a point-of-sale ordinance will be considered as a means to ensure that this important goal is obtained.

Measure BE-2.1	**Consider developing and implementing point-of-sale residential energy and water efficiency upgrade requirements and/or incentives if necessary.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
4,260	Low	Yes (mandatory)

Based on residential property turnover in 2000, it is estimated that approximately 32% of Piedmont's existing single-family homes will be sold to new owners between 2010 and 2020. As the economy improves and related programs are developed, if necessary, the City will consider developing and implementing a Residential Energy Conservation Ordinance. If such an ordinance were adopted, the City would require or facilitate completion of key efficiency upgrades at the point-of-sale, prior to transfer of ownership.

Upgrades would include the elements described in the Alameda County Waste Management Authority's Basic Home Energy Retrofit Package or equivalent upgrades that achieve a 20% efficiency improvement. The package would include attic insulation, programmable thermostats, water heater insulation, hot water pipe insulation, and draft elimination through caulking and sealing. It is estimated that the total cost of such improvements in Piedmont would be approximately $7,500 to $10,000 per single-family home (as of 2009). Financing options described in Measure BE-2.2 would reduce this up-front cost to homeowners.

To achieve the estimated levels of GHG reduction, approximately 2,150 residential units in Piedmont (or about 55% of all units) would need to improve energy efficiency by at least 20% between 2010 and 2020. While this level of reduction would ideally be achieved through voluntary retrofits, it is possible that the point-of-sale ordinance will be necessary to achieve the measure's reduction goal.

Some improvement is anticipated in the short-term, particularly if the City establishes an AB 811 renewable financing program and/or an energy efficiency retrofit loan program. However, deferring adoption of such an ordinance would reduce its ability to generate emissions reductions. Thus, a greater number of homes may need improvements, the level of efficiency to be achieved may go up, and the potential cost to homeowners may be greater.

Measure BE-2.2	**Identify and consider developing financial incentives and low-cost financing products and programs that encourage investment in energy efficiency and renewable energy within existing residential buildings.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Included within BE-2.1	Low to Medium	Yes (voluntary)

Up-front costs of energy efficiency improvements would be a considerable burden for many homeowners. The City, in partnership with Alameda County, PG&E, and/or private lenders, will consider providing a series of cost-effective financing options to reduce this burden. Financing options could include, but are not limited to, on-bill financing, low interest loans, energy efficient mortgages, revolving loans from bond sales, or an energy efficient Local Improvement District (LID).

The potential structure of the proposed programs and products varies greatly. On-bill financing, low interest loans, and energy efficient mortgages establish a lender/borrower relationship in which the City, utility, County, or private lender loans the building owner money to pay for upgrades and the amount loaned is paid back over time. The cost (or payback) to the City is wholly dependent on how much the City intends to subsidize interest rates. Costs would also depend on the increase in energy costs, whether carbon offsets can help pay for improvements, energy efficiency rebates, and potential federal tax credits. In the case of the bond, the City would administer a revolving loan fund with the bond proceeds, pursuant to provisions of AB 811.

A number of options are available to the City, including establishing and participating in a countywide program where homes would obtain an energy audit by a certified energy audit specialist at the point of sale, who would calculate the estimated energy efficiency improvement cost. This amount would either be charged as a voluntary property tax assessment paid over a pre-defined period (i.e., the length of payment

would be based on the length of the bond); or the property owner would be charged as an additional property transfer tax at the point of sale. Property owners would then make improvements to their home based on the recommended changes and would be reimbursed after confirmation by the certified energy audit specialist. The process would be run similar to car smog regulations, with pre-authorized or certified private specialists undertaking the audit. Home inspection companies and contractors would likely obtain state certification to augment their existing business.

Another option includes establishing on-bill financing, which would amortize the cost of energy efficiency retrofits to the property's monthly energy bills. In this scenario, the property owner would be reimbursed by the utility (i.e., Pacific Gas and Electric). The intent would be to create marginal to no financial impact to the property owner as the amortized costs would be similar to the monthly energy savings.

Though financial incentives would offset some portion of the cost associated with energy efficiency retrofits of distributed renewable energy generation, some cost would be borne by the home owner. This cost would either be an initial capital investment, or a long-term financing cost. In many cases, these costs would be exceeded by the savings generated by the investments over the long-term.

Measure BE-2.3	**Educate residents about the availability of free home energy audit programs and encourage implementation of audit findings.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Included within BE-2.1	Low	No

Many homeowners are not aware of the energy and cost saving potential of relatively minor home improvements. The City will encourage residents to participate in free energy audit programs offered by various community non-profits. Additionally, the City will partner with PG&E and conduct a variety of public education and outreach campaigns to promote energy efficiency improvements within homes and businesses in the community.

Objective BE-3:

Consider Retrofitting Existing Commercial Buildings

The City seeks to provide a comprehensive commercial energy efficiency improvement program that educates property owners and businesses about efficiency improvements, and provides financial incentives. The City envisions that educational programs, financial incentives, and potential for energy cost savings will encourage many businesses to voluntarily invest in efficiency improvements. A commercial point-of-sale ordinance, if adopted, would create further energy efficiency improvements in commercial buildings.

Measure BE-3.1	**Consider developing and implementing point-of-sale commercial energy efficiency upgrade requirements and/or incentives if necessary.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
40	Low	Yes (mandatory)

Based on commercial property sales data from 2000, it is estimated that approximately 30% of commercial buildings will be sold between 2010 and 2020. As the economy improves and related programs are developed, the City will consider adopting a Commercial Energy Conservation Ordinance if necessary to achieve the community's GHG reduction target. If such an ordinance were adopted, the City would require or facilitate key efficiency upgrades within commercial buildings built prior to implementation of Title 24 at the point-of-sale, prior to the transfer of ownership.

The Commercial Energy Conservation Ordinance, if adopted, would require or facilitate a 12% improvement in building energy efficiency. Due to the diversity of building types and a desire to provide owners with maximum flexibility, specific efficiency improvement requirements are not defined.

In general, older buildings would require a more substantial investment to meet this requirement, and newer buildings constructed since Title 24 was established would require a relatively smaller investment to meet this energy performance standard.

Measure BE-3.2	Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Included within BE-3.1	Low to Medium	Yes (voluntary)

Up-front costs of energy efficiency improvements are a considerable burden for many commercial building owners and long-term tenants. The City, in partnership with Alameda County, PG&E, and/or private lenders, will provide a series of cost-effective financing options to reduce this burden. Financing options could include on-bill financing, low interest loans, energy efficient mortgages, revolving loans from bond sales, or an energy-efficient Local Improvement District (LID). See Measure BE-2.2 for further discussion of these finance tools.

Though financial incentives would offset some portion of the cost associated with energy efficiency retrofits of distributed renewable energy generation, some cost would be borne by the property owner. This cost would either be an initial capital investment, or a long-term financing cost. In many cases, these costs would be exceeded by the savings generated by the investments over the long-term.

Measure BE-3.3	Partner with PG&E to provide a business education program that encourages commercial energy efficiency improvements.	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Included within BE-3.1	Low	No

In cooperation with PG&E and the East Bay Municipal Utility District (EBMUD), the City will provide outreach programs to community businesses. These new programs would target specific commercial sectors such as retail and office uses to provide useful energy and cost savings recommendations.

Objective BE-4:

Consider Requiring Energy Performance In New Construction

To minimize building-related GHG emissions, all new construction should achieve a high degree of energy and water efficiency, utilize passive solar design, reduce construction waste, and utilize resource efficient materials. In 2008 the City adopted a Civic Green Building Ordinance that requires all new civic buildings over $3 million to achieve Leadership in Energy and Environmental Design (LEED) certification. The City will expand the existing Civic Green Building

Ordinance into a general Green Building Ordinance that covers residential, commercial, and civic construction, and incorporates the energy and water efficiency standards contained in the California Green Building Code within the ordinance.

Measure BE-4.1	**Consider adopting additional standards for energy and water efficiency if necessary.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
20	Low	Yes (mandatory)

The City will consider adopting an expanded Green Building Ordinance incorporating energy and water efficiency standards contained in Chapter 5 and 6 of the 2008 California Green Building Code if such standards are necessary to achieve the community's GHG reduction target. Adoption of these standards would provide for a 15 to 30% increase in energy efficiency over 2008 Title 24 requirements, and a 50% increase in outdoor water use efficiency above the California Model Water Efficient Landscape Ordinance.

Constructing to the California Green Building Standards would generally result in some construction cost premium. This construction cost would likely be passed onto the homebuyer or leasee in the form of a premium on home prices or lease rates.

Measure BE-4.2	**Provide development incentives for buildings that exceed the State's current Title-24 standards for energy efficiency by 25%.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	Yes (voluntary)

The City will encourage the development of green buildings that exceed the minimum energy efficiency requirements by 25% by providing incentives such as expedited permit processing and density and height bonuses.

Constructing a highly energy efficiency building would be expected to result in increased construction costs. Energy efficient buildings can result in reduced operational costs to the building owner or tenant.

Objective BE-5:

Maximize the Use of Renewable Energy

To meet the GHG reduction targets expressed in AB 32 and Executive Order (EO)-S-05, we must reduce use of fossil fuel-based energy. Expanding renewable energy generation capacity within Piedmont will

aid this effort. The City will develop a comprehensive renewable energy program that educates residents and businesses about the potential for solar energy generation within the community and provides financing mechanisms that maximize participation.

Measure BE-5.1	**Develop a comprehensive renewable energy financing and informational program for residential and commercial uses.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Costs**
1,620	Low	Yes (voluntary) (unless property owner has a purchase agreement with a solar company)

Ten percent of all homes in Piedmont will need to install solar photovoltaic and solar hot water heating systems by 2020, in order for the community to achieve the estimated 1,620 MT CO_2e of GHG reductions associated with the development of renewable energy. To help facilitate achievement of this goal, the City will partner with adjacent cities and Alameda County to create an effective renewable energy financing program. The program, similar to Berkeley's Financing Initiative for Renewable and Solar Technology (FIRST) program, will allow residential and commercial property owners to repay the cost of solar and other renewable energy systems through a voluntary tax increment on their property tax bill. The City will pay the installation cost of a renewable energy system for approved applicants. In turn, the City will add a line item to the owners' property tax bill sufficient to repay the cost of the energy project plus interest over 20 years. If the property is sold, both the renewable energy system and the remaining debt stay with the property. Property owners will also be able to finance the renewable systems by using this program in conjunction with the California Solar Initiative (CSI) rebate program.

Through AB 811, a City or County can adopt a voluntary community benefit district for this purpose. Alameda County is currently exploring the viability of setting up a program. Obtaining low-cost bond financing is critical. Current bond interest rates assume seven percent. Under a seven percent interest rate, property owners with excellent credit have access to lower-cost financing through traditional banks. Moreover, the specific logistics of the program have yet to be determined, but its participation will be highly dependent on the availability of low-cost financing.

Developing distributed renewable energy generation facilities (i.e. building integrated solar or wind) could occur either through capital investments provided by the property owner, or through power purchase agreements. For property owners who finance the renewable energy facility development with their own capital, some portion of the capital cost can be offset through federal and state tax incentives and rebates. The long-term maintenance cost, however minimal, would be borne by

the property owner. Over a long period of time, these costs could be offset by the savings generated through reduced or eliminated utility bills. For property owners who elect to use a power purchase agreement, the capital costs are fronted by a company that will install and maintain the renewable energy generation equipment. This company would also retain ownership over the equipment. The property owner's expenses would only come from the long-term negotiated energy rates established in the power purchase agreement, which generally result in savings over the long-term.

Measure BE-5.2	**Join Bay Area efforts to ensure green public transit energy sourcing.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	No

Today, public transit in the Bay Area uses a diversity of energy sources including electricity, gas, diesel, natural gas, biodiesel, and hydrogen to power vehicles. Opportunity exists to transition public transit to renewable energy sources. Over time, renewable energy could make transit a GHG-neutral form of transportation. The City will join existing efforts to encourage Bay Area transit agencies to switch to renewable energy sources. However, before the City will support the use of biofuels, it will require the agencies to consider the lifecycle effects associated with each fuel type. The City will not support the use of biofuels that create remote environmental impacts such as rainforest habitat destruction or global food price increases.

Objective BE-6:

Community Energy Management

Climate change requires utilities, cities, and consumers to rethink how we use energy. Advanced lighting fixtures and systems, community choice aggregation, and consumer education programs offer three promising ways to achieve this goal.

Measure BE-6.1	**Work with Alameda County to convert street lights to LED bulbs or LED-solar systems.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	No

Replacing conventional lamps in streetlights to Light Emitting Diode (LED) lamp technologies is a proven and cost-effective way to reduce both energy consumption and GHG emissions. Cities that have converted streetlights to LED have reduced their energy consumption by up to 70% (California Lighting Technology Center 2009). An additional benefit of

using LED lamps is the ability to focus LED lights upon intended targets, allowing greater distance between lamp posts and reducing light pollution and glare.

The City will work with Alameda County to convert street lights in an appropriate area to LED bulbs or LED-solar systems as a preliminary test. Should the test prove successful, the City will consider replacing all City street lights to LED technologies.

Measure BE-6.2	**Research the feasibility of joining the Community Choice Aggregation efforts of Berkeley, Oakland, and Emeryville.**	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Not quantified	Low	No

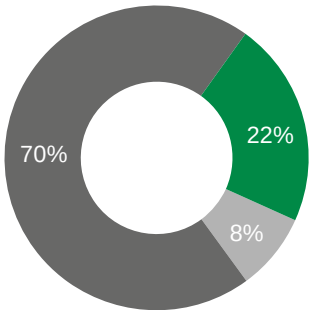
Piedmont has the option to join the community choice aggregation (CCA) efforts of other Alameda County cities including Berkeley, Oakland, and Emeryville. AB 117 (2002) enables California cities and counties, either individually or as groups, to supply electricity to customers within their borders. Unlike a municipal utility, a CCA does not own the transmission and delivery systems, but is responsible for providing electricity to its constituent residents and businesses. The CCA may or may not own electric generating facilities. The benefits of a CCA are directly relevant to GHG reduction efforts, as communities are able to proactively determine the amount of renewable energy they purchase. On average, CCAs can provide energy at prices 15 to 20% lower than investor owned utilities (LGC 2006).

Measure BE-6.3	**Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.**	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
160	Low	No

PG&E and EBMUD provide Piedmont residents and businesses with energy, water, and sewer services. The City will encourage these utilities to provide comparative energy and water conservation metrics and educational statements on utility bills. The bills should include statements that support efficient consumer practices and provide inefficient consumers with practical information on how to reduce their bills and energy consumption. The statements should also contain an efficiency ranking metric of similar uses in the community. This practice has been found to achieve a 2% reduction in residential electricity consumption (Tsui 2009).

Waste and Water Strategy

Minimize waste and celebrate water as an essential community resource.



Total GHG Emissions Reduced:
2,150 Metric Tons

Objectives:
WW-1: Become a Zero Waste Community - 64%
WW-2: Conserve Water Resources - 36%

Waste and water are not the most obvious sources of GHG emissions in the community. Most emissions associated with the products we consume are created before we purchase them or after we put them in the trash can. Likewise, most water-related emissions occur upstream from the tap or after water goes down the drain. While waste and water emissions are not highly visible, their associated reduction measures are an important component of the City's strategy to reduce GHG emissions.

Waste

The City has the ability to reduce the majority of the community's waste-related emissions by 2030. Increasing the City's waste diversion target, extensive public outreach, and regional policy advocacy will aid achievement of this goal.

Background

How waste generates GHG emissions

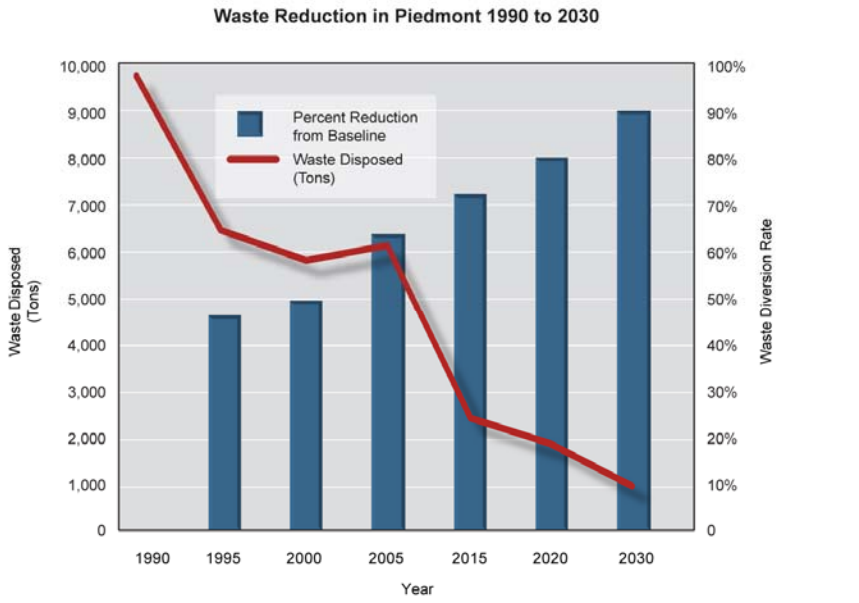
In nature, waste equals food and nutrients flow in a cyclical pattern. When a leaf falls from a tree to the forest floor it becomes food for insects and microbes, and eventually turns back into nutrients for new plant growth. In modern times, humans have established linear waste flows where materials are extracted, processed, used, and then discarded into landfills or incinerated. These linear waste flows create GHG emissions in three ways:

- **Landfills:** Each year, Americans throw away 84.2 million tons of biodegradable food scraps, yard trimmings and paper products (EPA 2006). These organic materials breakdown in anaerobic landfills and emit methane, a potent GHG. Additional emissions are generated when waste is transported to landfills.
- **Waste incineration:** Americans burn 31.4 million tons of municipal solid waste annually (EPA 2006). While most waste incinerators also produce electricity, they emit considerably more CO_2 per megawatt hour than fossil fuel power plants.

- **Lifecycle considerations:** Each year Americans bury or burn 123 million tons of manufactured commodities such as paper, metals, plastics, and glass. Instead of reusing these discarded materials, virgin materials are mined or harvested to produce the next round of consumable goods. Continuous consumption of virgin materials requires tremendous amounts of energy. The lifecycle energy invested in extracting, processing and transporting virgin materials is responsible for a large amount of GHG emissions. In addition to being energy intensive, the extraction of virgin materials is one of the main causes of deforestation, which accounts for as much as 30% of global GHG emissions.

Waste Reduction in Piedmont

In 1989, the California State legislature signed the Integrated Waste Management Act (AB 939) into law, mandating cities and counties to divert 50% of their waste flows from disposal by 2000. Since 1976, StopWaste.org has been a national leader in waste reduction and diversion. In cooperation with Alameda County, the City has taken meaningful steps to reduce waste generation over the past two decades. In 1990, Piedmont landfilled approximately 9,485 tons of garbage. By 2005, the City had effectively diverted 64% of its solid waste from disposal in landfills through the implementation of recycling and waste reduction programs. In 2008, the City established a 75% waste diversion goal for 2010. Recent data indicates that the City is on track toward achieving this goal.



Towards Zero-Waste

Looking ahead, leading waste management experts envision a future where society produces zero waste. In this future, all synthetic materials are recycled over and over again as the same material and all biological materials are composted and returned to the soil. If we successfully transition to producing zero waste, landfills and incineration would become essentially obsolete.

Lifecycle considerations would also decrease as the extraction of virgin materials greatly decreases. Waste-related GHG emissions would be considerably reduced.

While the technical capacity to eliminate waste in a cost-effective manner exists, implementation may take more than a decade. If Piedmont were to increase recycling, composting and source reduction at a rate of approximately 1% per year, an 80% reduction in waste generation could be achieved by 2020, and a 90% reduction could be achieved by 2030.

Objective WW-1:

Become a Zero-waste Community

Piedmont recognizes that moving to a zero-waste culture is a critical step toward reducing a wide range of environmental effects, including the community's GHG emissions. The City's waste reduction measures build on existing efforts and focus on reducing GHG emissions by eliminating waste at its source while also maximizing recycling and composting in homes, businesses, and civic institutions.

Expanded waste prevention and recycling programs will make important contributions to reducing energy needs for manufacturing, packaging, and shipping virgin products. Expanded composting programs will reduce methane produced in landfills and improve the productivity of local agriculture. Piedmont will join other cities to encourage the State and the federal government to adopt extended producer responsibility legislation that holds manufacturers accountable for their products and packaging through their full lifecycle. Manufacturers would in turn design products from materials that can be easily recycled or composted. Successful extended producer responsibility legislation is critical to achieving a zero-waste goal in Piedmont.

Measure WW-1.1	**Establish a zero-waste reduction target for 2030 and work with Alameda County, neighboring cities, and other organizations to leverage the zero-waste effort.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
1,380	Low	No

The City will urge the State and the federal government to pass legislation that requires extended producer responsibility and improves the recyclability of products and packaging. As part of a zero-waste goal, the City will consider adopting a resolution to achieve 90% waste reduction and diversion by 2030. Achieving this target will require full participation from residents and businesses and collaboration with StopWaste.org and neighboring cities. The City will conduct a variety of outreach programs to increase participation in waste reduction,

recycling, and composting programs. The City will also encourage residents to participate in junk mail elimination programs.

To promote achievement of the 2030 goal, the City will consider adopting an ordinance requiring all household and commercial food scraps and food soiled paper to be placed in organics carts, all commercial food service providers to use recycling and organics services, and the City's waste collection contractor to minimize collection route distances and use fuel efficient vehicles.

Measure WW-1.2	**Establish an environmentally responsible government purchasing policy.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	No

Including environmental considerations in purchasing decisions will allow the City of Piedmont to promote practices that conserve natural resources, reduce GHG emissions, and reward environmentally conscious goods manufacturers. The City will establish an environmentally responsible purchasing policy. One of the purchasing criteria will give preference to products produced with little or no GHG emissions.

Water

Water conservation measures protect the region's limited water resources, conserve energy, and reduce GHG emissions. A considerable amount of energy is used every day to pump, treat, transport, heat, and cool the water we consume. Additionally, almost all water used in homes and businesses is eventually treated as wastewater, requiring further energy inputs. The City's water conservation strategy seeks to reduce both water consumption and wastewater production in Piedmont's residential, commercial, and civic buildings and properties.

Background

Water Consumption

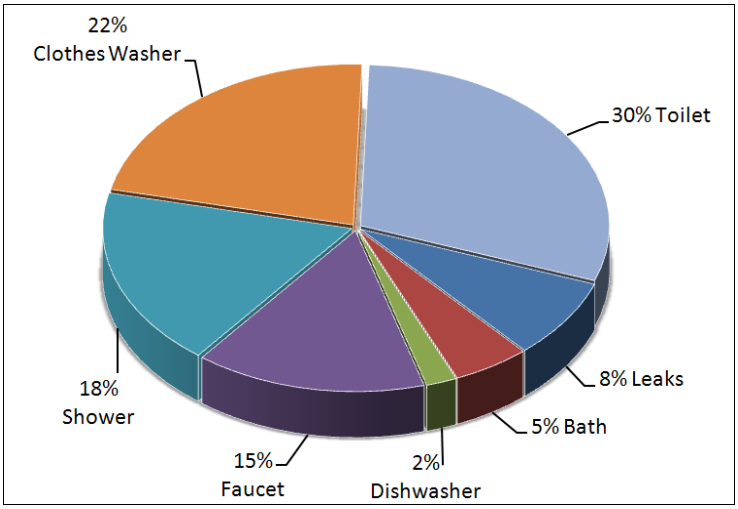
EBMUD is the City's water utility. Within EBMUD's jurisdiction, residential uses create 63% of total water demand. Commercial uses consume 14%, and industrial and all other uses consume 23%. While water conservation is important across all sectors, residential water demand plays the most critical role in the region's water management efforts.

Residential water consumption consists of indoor and outdoor applications. The ratio of indoor to outdoor consumption is related to both housing type and the size of a residential lot. The average East Bay single-family residence uses approximately 62% of its water indoors, and 38% outdoors. Residences on larger lots with more irrigated landscape will have a higher percentage of

outdoor water use. Multi-family units use considerably less water per unit outdoors since multi-family yards are smaller and often shared by other tenants. Indoor water use consumes 86% and irrigation consumes 14% of multi-family water demand.

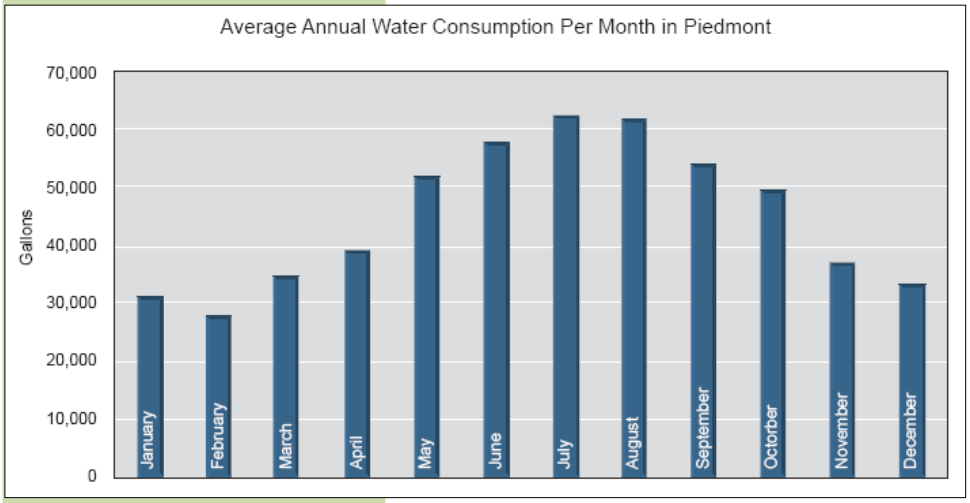
Indoor Residential Water Use

In the average Piedmont household, toilets consume the largest amount of water, followed closely by clothes washers, showers, and faucets. Water leaks account for approximately 8% of all water consumption. With relatively minor upgrades to faucets, fixtures and other appliances, Piedmont could conserve considerable amounts of water.



Irrigation

Outdoor irrigation constitutes an important part of Piedmont's water demand. Total water consumption doubles during dry portions of the year. In late spring, soils dry up and many landscapes require watering to support plants that are poorly adapted to Piedmont's Mediterranean climate. If more native or drought resistant plant species were used in landscaping, considerable amounts of water could be conserved.

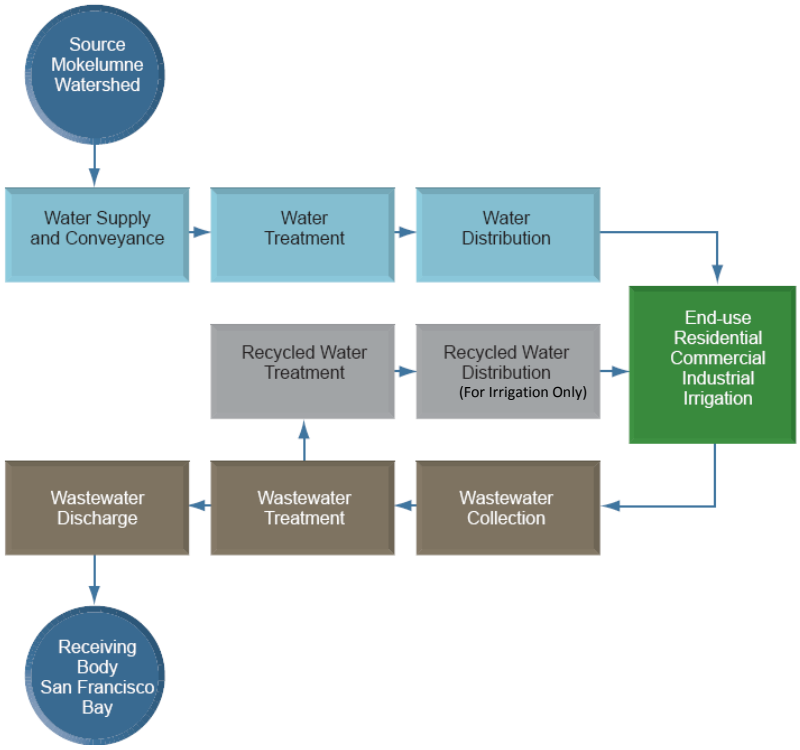


In 2009, Piedmont adopted an ordinance requiring use of Bay-Friendly Landscape practices on all municipal landscaping projects with costs of $100,000 or more. The Bay-Friendly Landscape guidelines promote a wide array of techniques that conserve water and improve water quality including integrated pest management techniques, low flow irrigation systems, and the incorporation of native drought tolerant plants.

Piedmont's Water System and Associated GHG Emissions

For explanatory purposes, Piedmont's water system can be separated into three distinct components: delivery, end-use consumption, and post-consumption processing.

Piedmont's Water Use Cycle



Delivery

EBMUD has one of the most energy-efficient water delivery systems in California. EBMUD receives 95% of its water from the Mokelumne River in the Sierra Nevada and water is conveyed by gravity through aqueducts to the East Bay. This gravity-driven conveyance system uses little energy. Because Mokelumne River water is of relatively high quality, it requires minimal treatment. As EBMUD's treatment facilities are located high in the East Bay hills, the elevation difference between the treatment facilities and end users pressurizes the distribution system, again requiring relatively little energy to deliver water to customers.

End-use Consumption

After water is delivered to EBMUD customers, it is used for a variety of purposes, consuming the majority of water-related energy. Residential uses include bathing, dish and clothes washing, toilets, and landscape irrigation. Energy is consumed during domestic water treatment (filtering and softening), heating (natural gas or electric water heaters), hot water circulation, and cooling (icemakers and chilled water systems for HVAC and chilled drinking water). Some of the more energy-intensive applications specifically related to commercial water use include supplemental pressurization, process hot water and steam production, process chilling, equipment cooling, and cooling towers.

Post-consumption processing

EBMUD also provides the City's wastewater treatment, which consumes the second largest amount of water-related energy. Other than water used in landscape irrigation or lost through evaporation, all water consumed within the city is ultimately processed at EBMUD's wastewater treatment plant. The average wastewater facility uses about 1,050 kWh/million gallons to treat the wastewater to the degree it can be disposed of into a receiving water body such as San Francisco Bay. If wastewater is recycled for use in irrigation or industrial processes, an additional 500 kWh to 2,000 kWh/million gallons can be required for supplementary treatment and pumping the water to its final application.

Due to this additional energy demand and the low energy intensity of EBMUD's potable water delivery system, using recycled water may consume considerably more energy and produce more GHGs than if potable water were used for irrigation or industrial purposes. However, using recycled water provides valuable water conservation benefits, therefore the City must balance GHG emissions reductions with water supply considerations.

Stormwater

While Piedmont has separated sewer and stormwater systems, leaks in the City's sewers allow stormwater to infiltrate and flow into the system during winter rain storms. This infiltration and inflow mixes with the sewage and has to be treated, requiring energy and generating GHG emissions. The City is actively repairing numerous sewer lines to address this problem. Separated stormwater (i.e. rainwater that does not enter the sewer system) is not treated and therefore generates no GHG emissions.

Graywater and Rainwater Collection

Graywater and rainwater collection systems can be effective alternatives to using potable water for irrigation. Graywater systems use untreated household wastewater from bathtubs, showers, bathroom wash basins, and clothes washing machines. Using wastewater from kitchen sinks, dishwashers, or toilets is not allowed. In the East Bay, graywater makes up approximately 45% of a single-family home's wastewater output (EBMUD 2005). Incorporating graywater systems within homes and commercial buildings would eliminate this wastewater load and reduce Piedmont's water-related GHG emissions.

Current California law permits use of graywater systems for subsurface irrigation so long as they comply with Title 24, Part 5 of the California Plumbing Code. In 2008, the adoption of Senate Bill 1258 made graywater systems more feasible in the State. Though local governments retain the authority to prohibit graywater systems, the State encourages jurisdictions to permit compliant systems. To date, Piedmont has not approved the construction of graywater systems.

Rainwater is collected from roofs and other impermeable surfaces and stored in cisterns or barrels for use in dry weather irrigation. Rainwater can be used for either sub-surface or surface irrigation. Rainwater collection is currently practiced informally using gutters connected to collection barrels by some households in Piedmont. Larger rainwater collection systems use cisterns that require higher

levels of design and engineering. In Piedmont, rainwater collection systems would result in minimal GHG emission reductions, as using rainwater in place of potable water only avoids water delivery-related energy use.

Objective WW-2:

Conserve Water Resources

Water is one of Piedmont's most important and most constrained resources. Conserving water is an important community priority in its own right. Since water conservation also reduces GHG emissions, conservation provides additional incentives. The following measures seek to maximize water conservation throughout the community.

Measure WW-2.1	**Encourage residential and commercial users to participate in EBMUD's free water audit program.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	No

As described in the Buildings and Energy strategy, most of Piedmont's buildings are more than 30 years old. Water fixtures and appliances have improved considerably since that time, and replacing antiquated equipment would result in valuable water conservation benefits. Additionally, leaking pipes and faucets account for approximately 8% of water consumption in older buildings. The City will partner with EBMUD and Stopwaste.org to provide water conservation outreach programs and will encourage residential and commercial users to participate in free water efficiency audits.

Measure WW-2.2	**Encourage use of graywater and rainwater collection in existing residential and commercial uses.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
770	Low	Yes (voluntary)

The City will adopt an ordinance enabling property owners to construct rainwater collection and graywater systems conforming to Title 24 Part 5 of the California Plumbing Code. The City will also provide public outreach that educates residents and businesses about the opportunities to construct such systems on their properties. City Planning and Building staff will be trained to help interested parties understand the State code requirements for such systems.

Any home or property developer could elect to invest in rainwater and greywater collection, which generally would result in some construction cost premium associated with the materials, equipment, and installation of the collection systems. This construction cost premium

would likely get passed onto the homebuyer or leasee in the form of a premium on home prices or lease rates. Over the long-term, however, savings generated from reduced water utility bills could offset some portion of these costs.

Measure WW-2.3	**Develop a water efficient landscaping ordinance to implement the California Water Efficient Landscaping Ordinance and require or facilitate use of greywater or rainwater collection systems in new construction.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Included within WW-2.2	Low	Yes (mandatory)

In response to the community's concern over long term water supply, the City will adopt an ordinance implementing California's Water Efficient Landscaping Ordinance. In addition, the City's will require or facilitate use of graywater or rainwater collection systems in all new construction. New development would be required to provide 50% of the property's annual landscape irrigation using graywater and/or rainwater collection systems. The use of climate-appropriate landscaping is already encouraged through the City's adopted Bay-Friendly Landscaping Ordinance.

Home builders or property developers would be required to construct buildings compliant with this rainwater and greywater ordinance, which generally would result in some construction cost premium associated with the materials, equipment, and installation of the systems. This construction cost premium would likely get passed onto the homebuyer or leasee in the form of a premium on home prices or lease rates.

Measure WW-2.4	**Facilitate the installation of weather-based evapotranspiration (ET) controller irrigation systems in both City and private landscapes.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	Yes (voluntary)

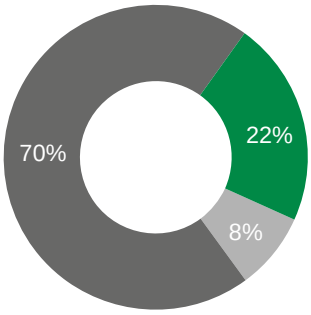
Weather-based ET controller irrigation systems analyze soil moisture content and irrigate only when plants need water. These systems optimize irrigation efficiency and avoid over watering. Studies demonstrate that such systems can reduce residential landscape irrigation by 16% (City of Irvine, 2001).

The City will install weather-based ET controller irrigation systems in all municipal landscapes. The City will also develop a program to encourage the use of ET controllers in private landscapes. The City will require or facilitate use of ET controllers or an equally effective technology for new development and landscape projects over 2,500 square feet.

Any home or property developer could elect to construct weather-based evapotranspiration (ET) controller irrigation systems, which generally would result in some construction cost premium associated with the materials, equipment, and installation of the systems. This construction cost premium would likely get passed onto the homebuyer or leasee in the form of a premium on home prices or lease rates. Over the long-term, however, savings generated from reduced water utility bills could offset some portion of these costs.

Transportation and Land Use Strategy

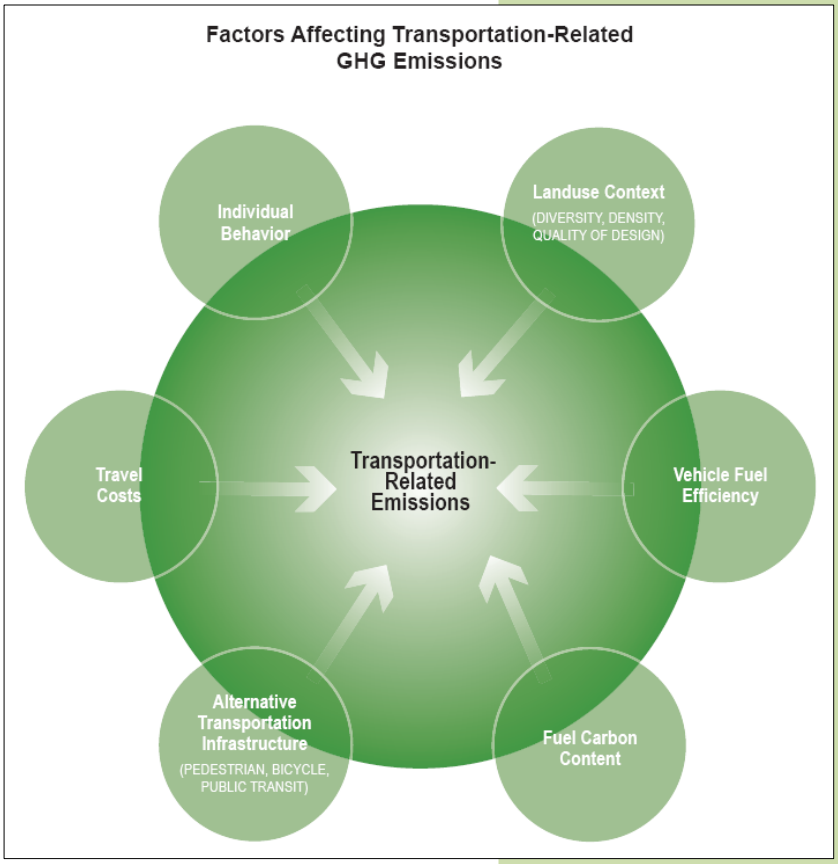
Shift travel from automobiles to walking, biking, and public transit.



Total GHG Emissions Reduced:
2,150 Metric Tons

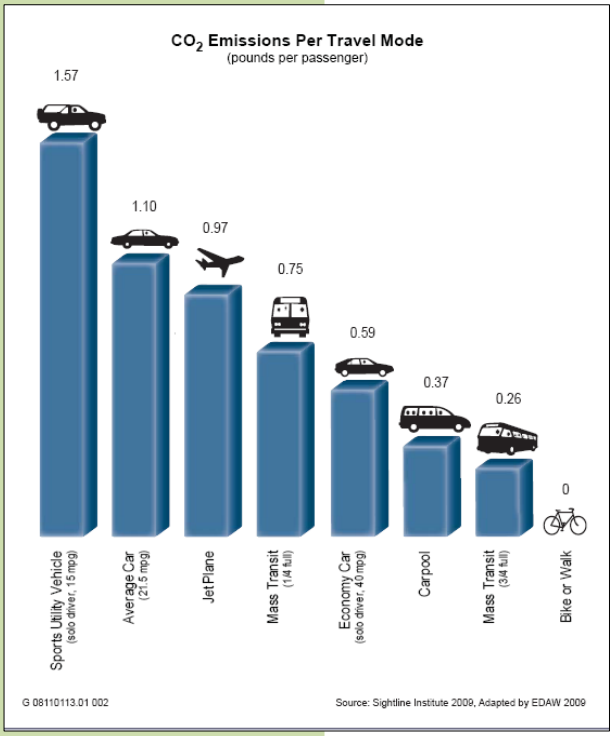
Objectives:
- WW-1: Become a Zero Waste Community - 64%
- WW-2: Conserve Water Resources - 36%

In many climate action planning processes, transportation and land use measures provide a considerable portion of a community's GHG emissions reductions. Due to a variety of constraints, such measures have limited reduction potential in Piedmont. Piedmont is almost entirely built out, has very few commercial properties, relatively low residential densities, limited infill potential, a curvilinear street network, and steep topography. Combined, these factors constrain the community's ability to effectively implement a wide variety of land use and transportation measures. Thus, while automobile-related GHG emissions constitute 41% of the community's baseline emissions inventory, the Transportation and Land Use Strategy provides only 8% of the CAP's overall GHG reductions.



While the potential transportation- and land use-related emissions reductions are limited in Piedmont, the measures contained within this strategy provide valuable reductions. These measures strive to increase resident use of alternative travel modes and reduce automobile dependence in Piedmont.

Background



The way that land uses and transportation infrastructure are arranged within a community has a strong influence on whether residents choose to walk, bike, use public transit, or drive. These travel choices directly affect the amount of transportation-related GHG emissions produced in Piedmont. Single-passenger automobile trips generate substantially more GHG emissions per mile than public transit and carpooling. Walking and biking are GHG-free transportation alternatives.

According to the 2000 U.S. Census, 62% of Piedmont residents drove alone to work, 17% carpooled, 10% rode public transit, 2% walked, 1% biked to work, and 8% worked from home. While carpooling and public transit constitute a notable share of commute trips, inefficient single-passenger automobile trips constitute the majority of the community's travel mode share.

Examining Piedmont's existing land use pattern and transportation infrastructure provides insight into ways the community can reduce GHG emissions. By improving transportation infrastructure and making subtle land use changes, Piedmont can increase walking, bicycling, and transit use. Factors most directly influencing travel behavior in Piedmont include: diversity of uses, proximity of uses, density, pedestrian and bicycle conditions, transit accessibility, parking, and streetscape design. Each of these is discussed in detail below.

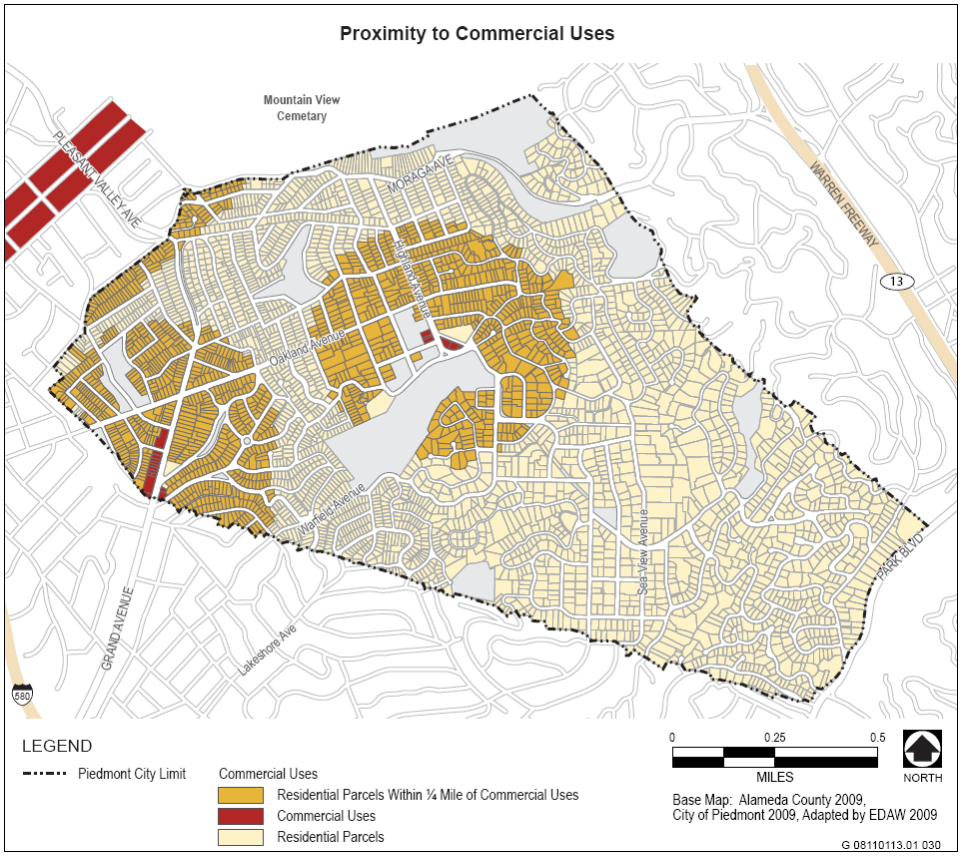
Diversity of uses – *The degree to which residential, commercial, industrial, institutional, and recreational uses are located together.*

A diversity of land uses (e.g. residential, commercial, office, civic) within a community can reduce the generation of transportation-related GHG emissions by reducing travel distances, and facilitating more walking and cycling trips. A jobs/housing ratio is commonly used to evaluate the diversity of land uses within a community, by describing the relationship between employment opportunities and housing supply. A ratio of 1.0 describes a balance between jobs and housing. A ratio above 1.0 indicates that there are more jobs than housing, while a ratio below 1.0 describes an undersupply of jobs relative to housing. In 2005, there were approximately 2,100 jobs and 3,800 households in Piedmont and the jobs/housing ratio was approximately 0.55. This demonstrates that there are vastly fewer jobs than housing opportunities within the City, and that many Piedmont residents commute to other communities for employment.

Piedmont is a built-out City with minimal opportunities to increase its employment base. For this reason there is limited potential to improve the jobs/housing ratio within the City. Because of this context increasing the diversity of uses in Piedmont will provide nominal GHG emissions reductions.

Proximity of uses – *The distance between neighborhood commercial services and residents' homes.*

Urban design research demonstrates that most people will walk to destinations that are within ¼ mile or a 5-minute leisurely walk. Neighborhoods are considered to be pedestrian-friendly if residents' homes are within ¼ mile of a diverse array of commercial and civic uses. About 33% of Piedmont's residential parcels are located within ¼ mile of the community's two commercial centers on Grand Avenue and Highland Avenue and adjacent centers in Oakland. The City's existing land use pattern limits opportunities for increasing opportunities for pedestrian travel to additional commercial services. Given that the City is essentially built-out, it is highly unlikely that additional neighborhood-serving commercial centers would be created within the community.

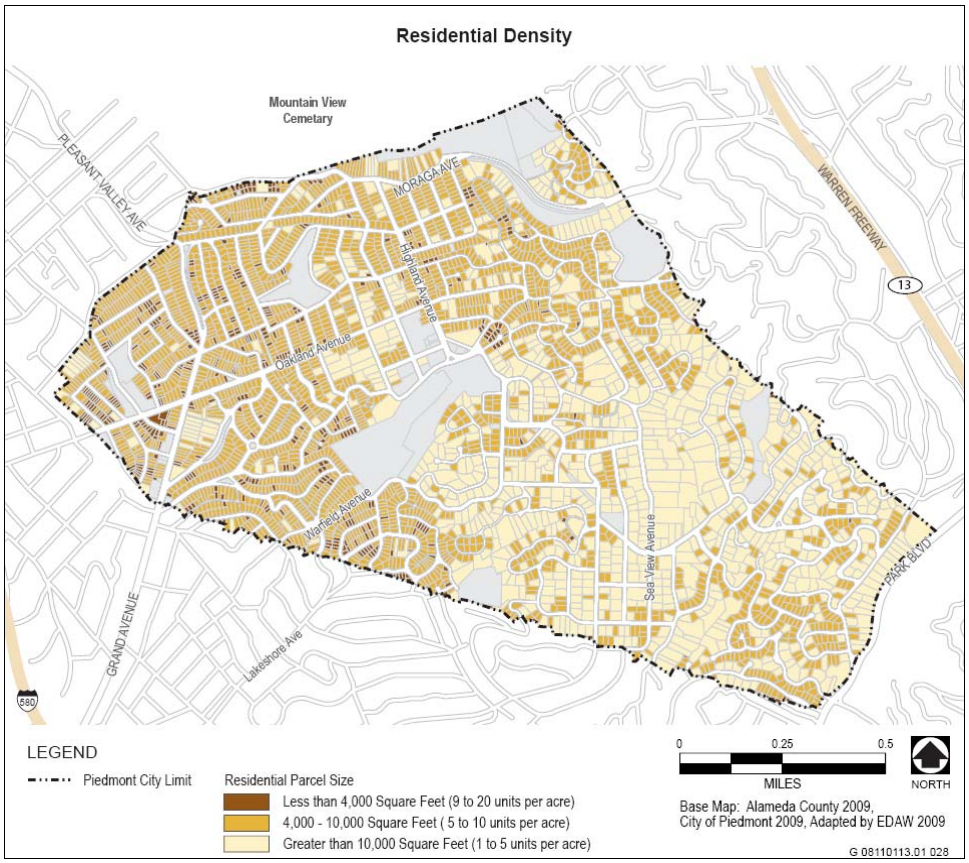


Density – *The number of housing units, people, or jobs in a given area.*

Higher densities tend to increase the number of services, shops, schools, and public buildings located within a neighborhood and increase the availability of transit and pedestrian infrastructure. These conditions tend to reduce the need for vehicle ownership and increase the use of alternative modes. Low densities conversely are often associated with higher levels of driving and transportation-related GHG emissions.

Residential Density

Residential density is normally measured in terms of housing units per acre. Approximately two-thirds of the City's residential parcels are between 4,000 and 10,000 square feet in size, and have density of approximately 5 to 10 units per acre. Approximately 21% of the City's residential parcels are greater than 10,000 square feet in size (1 to 5 dwelling units/acre), and 10% are less than 4,000 square feet in size (10 to 20 dwelling units/acre). The vast majority of residential parcels (3,780 of 4,106) contain only one single-family home each. Twenty-one parcels contain multi-family housing. One-hundred parcels contain second units in addition to a primary single-family unit.



Transportation planners assume that 7 units per acre is the minimal density required to support an intermediate level of local bus service (one bus every 1/2 hour) and 15 units per acre is required for frequent local bus service (one bus every ten minutes). The existing average densities in Piedmont make it difficult to expand bus transit services.

Pedestrian and bicycle conditions – *The quantity and quality of sidewalks, crosswalks, paths and bike lanes, and the level of pedestrian security.*

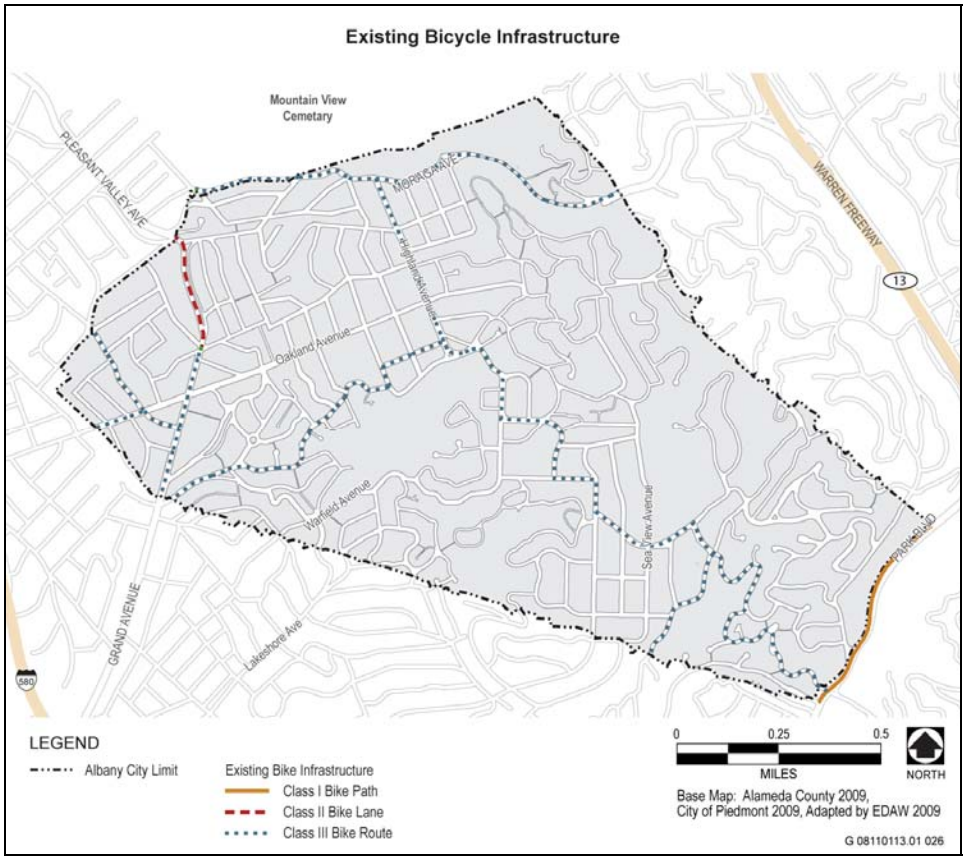
Well-developed pedestrian and bicycle infrastructure and pedestrian-friendly design are essential if walking and biking are to be important travel modes in a community. Highly connected sidewalks and bicycle infrastructure reduce travel distances between destinations and improve access and safety. Pedestrian and bicycle infrastructure includes sidewalks, crosswalks, traffic calming devices, bike lanes, and racks/storage facilities.

Pedestrian Infrastructure

Piedmont's pedestrian infrastructure is moderately developed. The City has a nearly complete sidewalk network and has a system of pedestrian footpaths that run between blocks, particularly in steep areas where the footpaths serve as short cuts. While most sidewalks are in good repair, some sidewalk sections are damaged by tree roots and create difficulties or barriers for strollers and the less physically able. The City has established policies and programs to ensure repair and continued maintenance. Other barriers include lack of sidewalk curb-cuts and the existence of utility poles and traffic signs located in the middle of sidewalks. Striped crosswalks are present on some of the City's major streets. Additional pedestrian safety improvements (e.g. median islands) have been made on northern stretches of Grand Avenue, but do not exist in other areas of the City.

Bicycle Infrastructure

Piedmont's existing bike infrastructure and network are minimal. Class I, II, and III bicycle infrastructure covers 16% of the mileage of City streets. Class I and II bicycle infrastructure covers only 2% of the mileage of City streets. A Class I bike path is located adjacent to Park Boulevard on the City's southeastern boundary. A Class II bike lane is located on one section of Grand Avenue between Arroyo Avenue and Cambridge Way. Class III bike routes are present on Moraga Avenue, Sheridan Avenue, Sea View Avenue and portions of Highland Avenue, Oakland Avenue, Magnolia Avenue, Wildwood Avenue, Crocker Avenue, Hampton Road, and St. James Drive.



Class I routes *operate within a completely separate right-of-way and are exclusively used by bicycles and pedestrians. Examples include the Shepherd Canyon bike path in Oakland (pictured above).*

Cycletracks, *or side paths, are segregated paths for bicyclists located next to a roadway. A sidepath is similar to a sidewalk, but designated for anyone traveling by bicycle. Cycle tracks offer cyclists greater protection than Class II facilities and are more economical in terms of space and cost than separated Class I bike paths.*

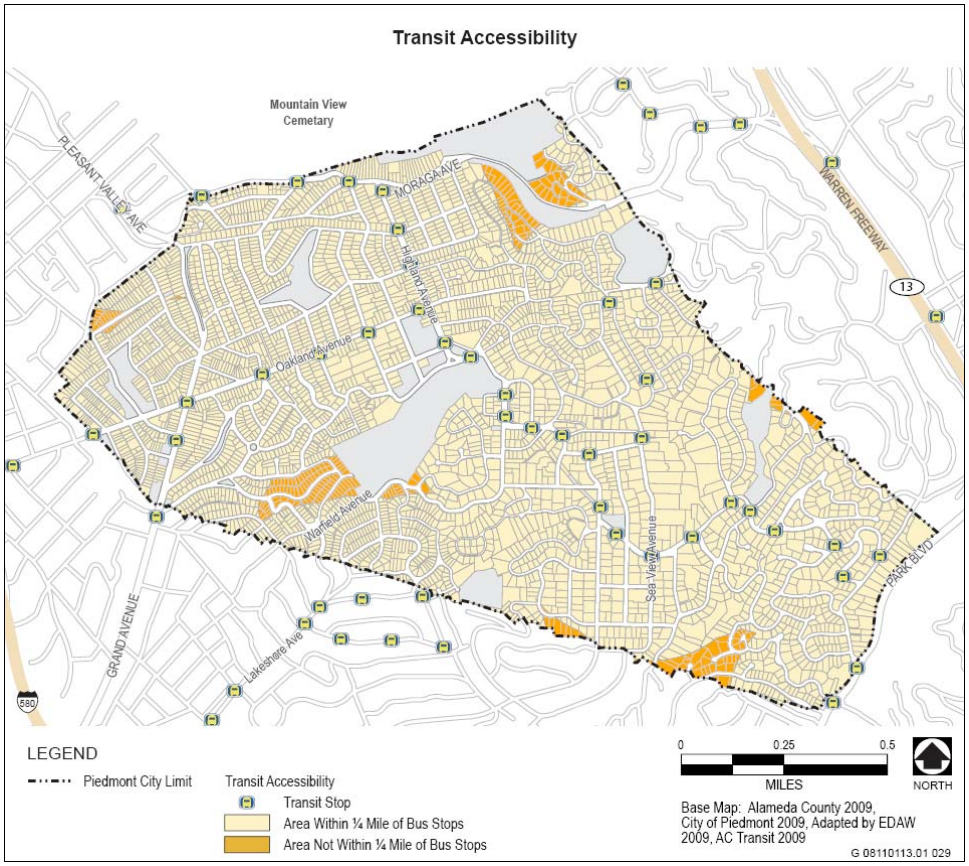
Class II routes*, or bike lanes, operate in a restricted lane within the right-of-way of a street. Motor vehicles are prohibited from using this lane, although cross-flows in and out of parking spaces and cross-streets are permitted. Examples include the Telegraph Avenue bike lane in Oakland.*

Class III routes*, or bike routes, operate within moving traffic lanes and are distinguished only by signs or pavement markings. Bicycles share the right-of-way with vehicles.*

Very few bike racks exist at commercial and civic uses within the City. This limited supply may reduce residents' desire to bike to these locations. Additionally, bike racks are often not provided in conjunction with bus stops in Piedmont.

Transit accessibility – *The ease with which people can access transit service and the quality of that service.*

Residents and employees are more likely to use transit if traveling by bus or train is relatively time-competitive with driving, if transit stations are accessible to pedestrian and cyclists, and if the transit experience is pleasant. Urban planners typically assume that people are willing to walk ½-mile to a light rail station or ¼-mile to a bus stop. A ¼-mile walk takes the average person around 10 minutes. In Piedmont, approximately 96% of residential parcels are located within ¼ mile of a bus stop.



Piedmont is currently served by seven local and express bus transit routes serving the East Bay and San Francisco. Lines C, P, and V serve trans-bay riders, while lines 11, 12, 18, and 41 serve local passengers. Residents in western Piedmont can use Lines 11 or 12 to reach the 19th Street or MacArthur BART Stations. Line 41 is a collector route, transporting passengers from eastern Piedmont to the Piedmont Civic Center. Riders must then transfer to Line 11 to reach Downtown Oakland and BART.

The trans-bay lines operate on weekdays only and generally serve westbound traffic in the morning and eastbound traffic in the late afternoon. Westbound

buses operate only between 5:30 AM and 9:00 AM and eastbound buses generally operate between 3:00 PM and 8:00 PM. These buses run on headways of approximately 30 minutes.

The local lines operate on a similarly limited schedule:

- Line 41 circulates through eastern Piedmont six times in the morning, and then every 30 minutes between 2:30 and 7:30 PM
- Line 11 leaves the Piedmont Civic Center and follows Oakland Avenue to Downtown Oakland every 20 minutes between 6:00 AM and 9:30 AM, every 30 minutes from 9:30 AM to 3:30 PM, and then every 20 minutes until 7:15 PM
- Line 12 crosses western Piedmont via Grand and Linda Avenues every 20 minutes from 6:15 AM to 9:30 AM, every 30 minutes from 9:30 until 3:30 PM, and then every 20 minutes from 3:30 until 8:00 PM

Additional routes exist in Oakland with bus stops within one-quarter mile of Piedmont. These routes provide bus transit accessibility to a small number of residents in the northern and southern portions of the City.

The closest BART station is MacArthur Station located at the Intersection of MacArthur Boulevard and Telegraph Avenue in Oakland. This station is approximately 2.5 miles from Piedmont's western border. The majority of residents that use BART either take the bus to the station or drive and park at the station.

Streetscape design – *The scale and design of* streets*, sidewalks, and adjacent uses.*

Urban design research demonstrates that people walk more and drive less in pedestrian-oriented commercial districts than in automobile-dominated centers. Street designs that reduce vehicle traffic speeds, improve walking and cycling conditions, and enhance the pedestrian experience encourage use of alternative modes.

While the City's Civic Center has some pedestrian-friendly features, Highland Avenue, the main road that bisects the City, is a wide automobile oriented major collector. Improvements such as reduced lane widths, median islands, alternative paving materials, and bulb-out pedestrian crossings could improve pedestrian safety and use in the area. Additional pedestrian improvements could be made along Oakland, Grand, and Moraga Avenues.

Transportation and Land Use Objectives and Measures

Objective TL-1:

Facilitate Walking and Biking in the Community

Walking and biking do not generate GHG emissions. To encourage residents to shift from their cars to these alternative travel modes, two essential elements are needed: a) safe and convenient pedestrian and bike routes, and b) a diversity of uses within a short distance of residents' homes. The following measures encourage increased walking and biking in Piedmont by investing in infrastructure, enforcing existing laws, and creating incentives to attract additional neighborhood-serving commercial uses.

Measure TL-1.1	**Consider expanding and enhancing bicycling and pedestrian infrastructure throughout the community if financially feasible and practical.**	
GHG Reduction Potential ($MTCO_2e$)	**Cost to City**	**Private Cost**
420	Medium to High (depending on type of infrastructure and extent)	No

Improving pedestrian and bicycle infrastructure will help reduce GHG emissions, enhance mobility for all ages and abilities, and increase the health and fitness of Piedmont residents. To achieve these multiple benefits, the City will work to improve the community's pedestrian and bicycle network. Improvements will be made to increase pedestrian, and cyclist safety.

Proposed pedestrian and bicycle infrastructure improvements will be based on street types and existing characteristics. Pedestrian infrastructure improvements will consist of additional cross-walks, sidewalk cuts, and traffic calming elements. Bicycle infrastructure improvements will include development of new cycletracks, Class II bike lanes, and addition of signs to improve cyclist safety. Streets with higher traffic volumes will include cycletracks or Class II bike lanes. Lower volume residential streets will be subject to minor improvements, such as signs and traffic calming features.

Measure TL-1.2	Install bike racks in commercial and civic areas of the City where racks do not currently exist if financially feasible and practical.	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
180	Low	No

Bike racks are essential to encourage bicycle ridership for commuting and daily shopping /errand running trips. The City will identify commercial and civic areas that lack appropriate levels of bicycle parking and will install the needed facilities. The City will also require or facilitate provision of adequate bicycle parking for tenants, employees, and customers in new commercial development.

Measure TL-1.3	Consider incorporating pedestrian-friendly design features into the City's civic/commercial centers.	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
60	Medium to High (Depending on extent of redesign)	No

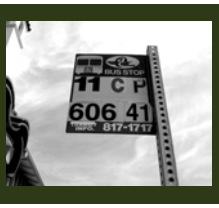
The City will consider developing streetscape designs for the civic/commercial area on Highland Avenue and the commercial area on Grand Avenue that focus on increasing pedestrian safety through reducing street lane widths, and adding features, such as median islands, alternative paving materials, and bulb-out pedestrian crossings. Additional signage, street trees, and other plantings will also be incorporated into the designs.

Measure TL-1.4	Evaluate the potential for mixed-use development within Piedmont's existing commercial center.	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
30	Low	No

The City of Piedmont will evaluate the potential for high-quality, mixed-use, pedestrian-oriented development in the Civic Center area and the Grand Avenue commercial area. As part of the Civic Center Master Plan, the City will identify opportunities to include appropriate mixed-use development in the commercial/civic area on Highland Avenue. If the evaluation indicates a good opportunity for mixed-use development exists, the City will prepare a specific plan for the commercial area on Grand Avenue with the intention of facilitating development of high-quality mixed-use infill projects in that area. The City will strive to facilitate the development of 10 new neighborhood serving uses in these two areas by 2020.

Objective TL-2:

Make Public Transit More Accessible and User-friendly



Public transit generates 80% less GHG emissions than the average private automobile and 40% less than a fuel efficient car (40 miles per gallon). For residents and employees to switch from automobiles to public transit, transit service needs to be convenient, comfortable, and reliable. The following measures seek to improve transit services and increase use of public transit travel modes.

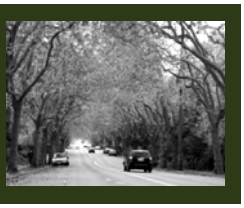
Measure TL-2.1	**Work with AC transit to conduct a public transit gap study and provide bus stops with safe and convenient bicycle and pedestrian access and essential improvements.**	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
70	Low	No

The City will work with AC Transit to conduct a public transit gap analysis to evaluate ways to increase transit ridership. The study will identify existing transit conditions and document deficiencies and opportunities for improvement. The study will provide the City and transit agencies with information needed to refine future transit investments and public outreach programs.

Improving the safety, comfort, and convenience of transit stations will encourage additional transit ridership in the community. The City will continue to work with AC Transit to provide shade, weather protection, seating, lighting, and route information at all transit stops in the community. The City will also evaluate pedestrian and bicycle access to transit stations and work to remove any existing barriers.

Objective TL-3:

Reduce Vehicle Emissions and Trips



To successfully reduce Piedmont's vehicle emissions, a variety of changes are required at the city, regional, state, and national levels. Vehicle GHG emissions are a function of vehicle miles traveled, vehicle efficiency, and the carbon content of a given fuel or alternative power source. While the City cannot control fuel carbon content or the efficiency of private vehicles, the State of California and the federal government are both mandating considerable improvements in these areas. The City does, however, have the ability to incentivize the use of efficient vehicles, facilitate ridesharing, and increase the use of alternative travel modes.

Measure TL-3.1	Improve fuel efficiency of the City vehicle fleet by purchasing low- or zero-emission vehicles when vehicles are retired from service. *(Emergency vehicles are exempt from this measure)*	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Not quantified	Low	No

The City will purchase highly efficient vehicle models when municipal fleet vehicles are retired. The City owns a variety of gas- and diesel-powered vehicles. When retired, these will be replaced by zero- or low-emission models. Priority will be placed on plug-in electric vehicles when appropriate. Heavy-duty vehicles will be replaced by the most efficient and cost-effective vehicles suitable for the purpose. Emergency vehicles shall be exempt from this requirement.

Measure TL-3.2	Provide preferential public parking spaces for electric and plug-in electric hybrid vehicles.	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Not quantified	Low	No

Preferential street parking spaces for electric and plug-in electric vehicles will encourage residents, employees, and visitors to purchase low or zero-emission vehicles and therefore assist the City in its efforts to reduce transportation-related emissions. The City will provide preferential parking spaces for eligible vehicle types throughout the community's commercial districts. The City will maintain a list of preferential parking eligible vehicles on the city's website. Other vehicles parked in the spaces will be ticketed.

Measure TL-3.3	Facilitate ride-share opportunities for community residents.	
GHG Reduction Potential ($MT CO_2e$)	**Cost to City**	**Private Cost**
Not quantified	Low	No

A considerable number of Piedmont residents commute to work via carpools. The City will work with the Metropolitan Transportation Commission (MTC) and other relevant agencies to further facilitate ride-sharing in the community. A core component of this measure will be to develop a social networking website where residents with similar commutes can find each other and create effective car pools. Additionally, the City will provide shade, weather protection, seating, lighting, and bike racks at casual carpool pick up areas to facilitate resident participation in casual carpools. The City will also explore the need for additional ride-share stations.

Measure TL-3.4	Work with schools to improve/expand walking, school bus use, safe routes to school programs, and trip reduction programs.	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
Not quantified	Low	No

A large portion of children are driven to school each day in private automobiles. The City will ensure that essential infrastructure improvements are made to enable safe routes to school. The City will also work with schools to create trip reduction programs that encourage walking, bicycling, carpooling, and public transit use. Specific attention will be placed on expanding the walking school bus programs throughout the community, where children walk to school in adult-supervised and school-coordinated groups.

Measure TL-3.5	Provide public education regarding reducing motor vehicle-related greenhouse gas emissions.	
GHG Reduction Potential (MT CO_2e)	**Cost to City**	**Private Cost**
50 (combined total for all education programs)	Low	No

The City will conduct a variety of education and outreach programs aimed at reducing residents' transportation related emissions. Various media will be used to convey messages about alternative transportation options and climate-responsible vehicle purchasing. Targeted advertisement programs will be created to encourage walking and bicycling in the City.

Additional Emission Reductions from Statewide Legislation

To implement AB 32, the State of California has established companion legislation that will reduce the generation of GHG emissions statewide, across all emissions sectors. SB 107 and AB 1493, described within Chapter I, establish performance standards for GHG emission reductions from electric utilities and motor vehicles, respectively. As the regulatory framework surrounding AB 32 grows, other future legislation will help further reduce GHG emissions statewide. At the time of CAP preparation, the City only has confidence in estimating the GHG emission reductions associated with SB 107 and AB 1493. In the future when additional legislation is further defined it will possible evaluate a wider range of statewide reductions. Please also refer to Chapter I for further discussion of State regulations regarding GHG emissions and climate change.

Senate Bill 107

SB 1078 and SB 107 have established increasingly stringent renewable energy requirements for California utilities. SB 1078 required investor-owned utilities to provide at least 20% of their electricity from renewable resources by 2020. SB 107 accelerated the timeframe to take effect in 2010. Renewable energy could include wind, solar, geothermal, or any "Renewable Portfolio Standard (RPS)-eligible" sources. It is anticipated that PG&E, Piedmont's electricity provider, would meet the 20% RPS requirement by 2010, as required by law, and this performance criteria would also be in effect at the CAP target year (2020). Therefore, in the year 2020, a minimum of 20% of the electricity consumed by the City's residential, commercial, and industrial uses would be produced by renewable resources and would not generate additional GHG emissions. Executive Order S-14-08 would increase the RPS further to 33% by 2020, but this order has yet to be codified at the time of preparation of this report. Thus, only the 20% RPS can be considered foreseeable at the time of writing.

The 2005 PG&E-specific electricity emission factor used to calculate GHG emissions associated with the City's electricity consumption accounted for the percentage of renewable resources used by PG&E for electricity production in 2005. PG&E's current (2008) electricity production portfolio is comprised of approximately 14% renewable resources (PG&E 2008). Although it is likely that the percentage of renewable resources in 2005 was less than in 2008, the difference between the 2008 and 2020 renewable resource portfolio was used to conservatively calculate the emission reduction attributable to SB 107.Therefore, an additional 6% of the City's 2020 GHG emissions associated with electricity consumption would be reduced between current conditions and 2020 associated with the implementation of SB 107. See Table V-6 below for the estimated emissions reduction effect of SB 107 on Piedmont's 2020 GHG emissions.

Assembly Bill 1493

As adopted in 2002, AB 1493 would result in GHG emission reductions from on-road passenger motor vehicles sold in California. Further, more stringent fuel economy standards have been proposed at the Federal level that may fulfill the desired GHG emission reductions directed in AB 1493. Thus, the intent to limit mobile-source GHG emissions in California and nationally exists. The emission reduction potential associated with implementation of AB 1493 vehicle emission standards would vary depending on the first regulated model year and vehicle turnover between the present fleet and the fleet in 2020.

Emission factors used (EMFAC 2007 and CCAR's *General Reporting Protocol* Version 3.1) to estimate 2020 and 2050 transportation-related GHG emissions do not account for mobile-source GHG emissions reductions that could be achieved through implementation of AB 1493 or equivalent regulations because the law has not been fully implemented at the time of writing.

To provide an estimate of the reasonably foreseeable GHG emission reduction potential of motor vehicle emission regulations, the GHG emissions reduction associated with AB 1493 was estimated using information presented in the AB 32 Scoping Plan. The AB 32 Scoping Plan expects approximately a 19.7%

reduction in on-road mobile-source GHG emissions (ARB 2008). AB 1493 allows two model years of lead time for automakers to comply with the vehicle emission standards. Therefore, the earliest model year that could reasonably be expected to comply with AB 1493 would be model year 2012. For this reason, it was assumed that AB 1493 would be 80% implemented by the year 2020 (allowing for two years of delay). Thus, the likely GHG emission reduction of AB 1493 on on-road mobile-source GHG emissions in Piedmont was assumed to be approximately 15.76%. See Table III-7 below for estimated GHG emission reduction potential of AB 1493 in the City of Piedmont.

Table III-7
Greenhouse Gas Emission Reductions from State Legislation

Legislation	GHG Emission Reductions from Projected 2020 Emissions (MT CO_2e)
SB 107	530
AB 1493	2,894

See Appendix A for detailed assumptions and calculations.

Statewide Reductions in Relation to CAP Measures

The emission reductions shown above in Table III-7 represent the upper bound of the potential emission reductions associated with SB 107 and AB 1493. Similar to the method used to quantify the City's CAP measures, the statewide emissions reduction estimates assume that no other emission reduction activities would occur. In reality, implementation of the City's CAP measures and the State regulations could occur, simultaneously or one preceding another. Thus, GHG reductions from emissions sectors affected by both City CAP measures and State regulations would not have a purely additive effect. Rather, emission reductions achieved by one (i.e., CAP measures or State regulations) would reduce the capacity of the other to reduce emissions. For example, if SB 107 reduces electricity consumption-related emissions by 6% then the potential for additional GHG reduction by the City's electricity conservation-related CAP measures would be reduced. Conversely if the City's CAP measures reduce the quantity of electricity consumption-related GHG emissions the overall effectiveness of SB 107 is reduced.

The timing and synergistic effect of the State regulations in relation to the City's CAP measures are uncertain. Nonetheless, because the focus of the CAP is on actions the City can take to reduce community-wide GHG emissions, the emission reductions achieved by the City's actions were determined first and independent of statewide reductions. As shown earlier in this chapter, implementation of the City's CAP would achieve the target of a minimum 15% reduction in GHG emissions in 2020 relative to 2005 conditions without including credit from State regulations. The emission reductions associated with SB 107 and AB 1493 would further reduce GHG emissions within the community.

Chapter IV
Implementation

Minimizing the adverse effects of climate change will require efforts from government, organizations, and individuals. To meet its greenhouse gas (GHG) emissions reduction targets, the City needs to prioritize actions; mobilize residents, business owners and staff; and work with neighboring jurisdictions and regional agencies to create workable solutions. This chapter describes the City's approach to implementing the Climate Action Plan (CAP) and provides actions to accompany each measure presented in Chapter III.

Approach

Translating CAP measures into on-the-ground results requires tangible action steps, reliable funding, and the flexibility to change course as economic, political, and environmental conditions demand.

This chapter contains the following sections:

- *Implementation Matrices:* An implementation matrix is provided for each CAP measure that describes recommended actions, timeframes, performance metrics, and responsible departments and agencies.
- *Funding Strategies:* This section describes funding strategies available to implement CAP measures and actions. Potential future financing tools are also identified.
- *Plan Adaptation and Evolution:* This section discusses the need for the CAP to be updated and amended over time to ensure that it remains relevant as the science of climate change continues to emerge and climate action policy evolves over time.

Implementation Matrices

The following matrices provide implementation strategies for each quantified CAP measure to assist City staff and other agencies responsible for carrying out CAP actions. The matrices also enable the City Council and the public to track key actions and deadlines and monitor progress. Each matrix provides the following information:

- *Action Steps:* The first table identifies the individual action steps needed to support each measure. Timeframes, responsible department(s), coordination requirements, and likely funding sources for each action are provided.
- *Performance Indicators, Monitoring, and Reporting Requirements:* The second table identifies indicators and performance standards to evaluate the performance of each measure and establishes monitoring and reporting requirements.

Even well-intended policies can be difficult to turn into reality. Because achieving the established emissions reduction target is vitally important, the City has identified individual actions that support each measure. Providing specific action steps for each measure improves the odds of successful implementation by forming clear lines of responsibility, establishing schedule priorities, defining likely funding sources.

Evaluating the performance of each measure is crucial for Piedmont to achieve its GHG reduction targets. While the City employed rigorous methods to estimate the emission reduction capacity of each measure, such estimations are inherently imprecise due to the wide range of assumptions employed in such calculations. As time progresses and climate change science advances, the City should evaluate the actual performance of each measure on an annual basis. Such evaluation may be accomplished by comparing actual performance to the performance standards established within this section. Ideally, the identified actions should cause measures to meet or exceed these standards. If they do not, the City should examine ways to increase measure performance or create new measures capable of making up for missed emission reductions.

The City's Public Works Department will track and report progress toward achieving the City's GHG emission reduction target of 15% below 2005 levels by 2020. The Division will provide annual reports to the City Council on the progress made toward achieving the reduction target as a whole, and for each quantified measure. The report will describe the following:

- Estimated GHG reductions for current year and to-date
- Implementation costs
- Cost savings and payback for given strategies
- Co-benefits realized
- Remaining barriers to implementation

Measure BE 1.1:	Install cost-effective renewable energy systems on all city buildings and purchase remaining electricity from renewable sources.		
Action		**Timetables**	**Responsibility**
A	Conduct energy audits of all municipal buildings.	Before December 31, 2010	Recreation
B	Evaluate the potential to locate cost-effective renewable energy systems on City properties.	Before July 31, 2012	Recreation
C	Purchase remaining energy from renewable sources or from PG&E's *Climate Smart Program*.	Before January 1, 2020	Finance
	Progress Indicators	**Target**	
i	Percentage of City's building energy saved through energy retrofits and conservation measures.	20% by 2015 40% by 2020	
ii	Percentage of City's building electricity from renewable sources.	100% by 2020	

Measure BE 1.2:	Install building performance data (energy and water) displays in all City buildings.		
Action		**Timetables**	**Responsibility**
A	Install electronic building performance displays in all publically accessible buildings.	Before December 31, 2014	Recreation
Progress Indicators		**Target**	
i	See Measure BE 1.1.	See Measure BE 1.1	

Measure BE 2.1:	Consider developing and implementing point-of-sale residential energy and water efficiency upgrade requirements and/or incentives if necessary.		
Action		**Timetables**	**Responsibility**
A	As the economy improves and related programs are developed, consider adopting a Residential Energy Conservation Ordinance requiring and/or incentivizing point-of-sale energy efficiency upgrades if necessary.	City Council item for consideration by December 31, 2015	City Council Public Works
B	Work with Stopwaste.org to verify that the required efficiency upgrade package achieves at least 20% improvement in the average Piedmont home.	Before December 31, 2015	Public Works
Progress Indicators		**Target**	
i	Percentage of residential units that have implemented energy efficiency improvements since 2004.	35% of residential units by 2015 55% of residential units by 2020	

Measure BE 2.2:	Identify and consider developing financial incentives and low-cost financing products and programs that encourage investment in energy efficiency and renewable energy within existing residential buildings.		
Action		**Timetables**	**Responsibility**
A	Evaluate various financing products that would encourage property owners to invest in energy efficiency upgrades and renewable energy systems in existing homes.	Before July 31, 2010	Finance Public Works
B	Consult with other agencies, utilities and private lenders to evaluate and develop cost effective financing products.	Before December 31, 2010	Finance
C	Develop a robust public outreach program to educate residents about the availability of energy efficiency improvement financing and benefits to home owners and community GHG reduction efforts.	Before July 31, 2011	Finance Public Works
Progress Indicators		**Target**	
i	See Measure BE 2.1.	See Measure BE 2.1	

Measure BE 3.1:	Consider developing and implementing point-of-sale commercial energy efficiency upgrade requirements and/or incentives if necessary.		
Action		**Timetables**	**Responsibility**
A	As the economy improves and related programs are developed, consider adopting a Commercial Energy Conservation Ordinance requiring or incentivizing point-of-sale energy efficiency upgrades if necessary.	Before July 31, 2015	City Council Public Works
B	Verify that the required efficiency upgrade package achieves at least 12% improvement in average Piedmont commercial building.	Before July 31, 2012	Public Works
Progress Indicators		**Target**	
i	Percentage of commercial buildings that have implemented energy efficiency improvements since 2004.	20% of commercial buildings by 2015 32% of commercial buildings by 2020	

Measure BE 3.2:	Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.		
Action		**Timetables**	**Responsibility**
A	See Measure BE 2.2.	See Measure BE 2.2	See Measure BE 2.2

Measure BE 3.2:	Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.		
Action		**Timetables**	**Responsibility**
Progress Indicators		**Target**	
i	See Measure BE 3.1.	See Measure BE 3.1	

Measure BE 4.1:	Consider adopting additional standards for energy and water efficiency if necessary.		
Action		**Timetables**	**Responsibility**
A	Consider adopting an expanded Green Building Ordinance incorporating energy and water efficiency standards contained in Chapter 5 and 6 of the 2008 California Green Building Code if such standards are necessary to achieve the community's GHG reduction target.	Before December 31, 2011	City Council Public Works
Progress Indicators		**Target**	
i	NA	NA	

Measure BE 5.1:	Develop a comprehensive renewable energy financing and informational program for residential and commercial uses.		
Action		**Timetables**	**Responsibility**
A	Develop a renewable energy financing program in conjunction with Alameda County and participating cities.	Before December 31, 2011	Finance Public Works
B	Develop a public information program to encourage residents and businesses to install renewable energy systems	Before December 31, 2011	Public Works
Progress Indicators		**Target**	
i	Percentage of residential and commercial buildings that have installed photovoltaic or solar hot water heaters.	15% by 2015 20% by 2020	

Measure BE 6.3:	Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.		
Action		**Timetables**	**Responsibility**
A	Work with PG&E and EBMUD to develop comparative energy and water conservation metrics for inclusion on utility bills	Before December 31, 2010	Public Works

Measure BE 6.3:	Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.		
Action		**Timetables**	**Responsibility**
Progress Indicators		**Target**	
i	NA	NA	

Measure WW 1.1:	Establish a zero-waste target for 2030 and work with Alameda County, neighboring cities, and other organizations to leverage the zero-waste effort.		
Action		**Timetables**	**Responsibility**
A	Develop a resolution of support to encourage the State and federal governments to pass legislation that requires extended producer responsibility and improves recyclability of products and packaging.	Before December 31, 2010	City Council
B	Adopt a resolution to achieve 90% waste reduction and diversion by 2030.	Before December 31, 2011	City Council
C	Expand outreach programs to maximize participation in waste reduction and diversion programs.	Before July 31, 2011	Public Works
D	Adopt a resolution of support that encourages the State and federal governments to create a voluntary *Do Not Mail Registry* to reduce junk mail deliveries.	Before July 31, 2010	City Council
E	Consider adopting an ordinance that requires all household and commercial food scraps and food-soiled paper to be placed in organics carts, all commercial food service providers to use recycling and organics services, and the City's waste collector to minimize collection route distances and use fuel efficient vehicles.	Before December 31, 2010	City Council
Progress Indicators		**Target**	
i	Community waste diversion rate	75% by 2015 80% by 2020 90% by 2030	

Measure WW 2.2:	Encourage use of graywater and rainwater collection in existing residential and commercial uses.		
Action		**Timetables**	**Responsibility**
A	Adopt an ordinance that incorporates provisions of the California Water Efficient Landscaping Ordinance and further enables	Before December 31, 2010	City Council Public Works

Measure WW 2.2:	Encourage use of graywater and rainwater collection in existing residential and commercial uses.		
Action		**Timetables**	**Responsibility**
	property owners to construct graywater systems and rainwater collection systems that conform to Title 24 Part 5 of the California Plumbing Code.		
B	Create an outreach program that encourages businesses and residents to construct graywater and rainwater collection systems on their properties.	Before July 31, 2011	Public Works
C	Provide City staff training regarding State code requirement for graywater systems in order to help interested parties develop systems.	Before July 31, 2011	Public Works
Progress Indicators		**Target**	
i	Percentage of residential and commercial properties that have implemented graywater and or rainwater collection systems since 2004.	50% by 2020	

Measure TL 1.1:	Consider expanding and enhancing bicycling and pedestrian infrastructure throughout the community if financially feasible and practical.		
Action		**Timetables**	**Responsibility**
A	Prepare and adopt a Bicycle Master Plan that coordinates with City of Oakland bicycle planning initiatives.	Before July 31, 2012	Public Works
B	Construct bicycle infrastructure improvements.	Before January 1, 2020	Public Works
C	Conduct a pedestrian obstacle study.	Before September 1, 2011	Public Works
D	Prepare and adopt a Pedestrian Master Plan.	Before December 31, 2012	Public Works
E	Construct pedestrian improvements identified in the pedestrian obstacle study and Pedestrian Master Plan.	Before January 1, 2017	Public Works
Progress Indicators		**Target**	
i	Bicycle network coverage (excluding Class III bike routes).	15% bicycle network coverage by 2015 25% bicycle network coverage by 2020	
ii	Percentage of street curbs with curb cuts.	100% by 2015	
iii	Pedestrian and bike mode share of commute trips.	5% combined by 2020	

Measure TL 1.2:	Install bike racks in commercial and civic areas of the City where racks do not currently exist.		
Action		**Timetables**	**Responsibility**

Measure TL 1.2:	Install bike racks in commercial and civic areas of the City where racks do not currently exist.		
Action		**Timetables**	**Responsibility**
A	Conduct bicycle parking analysis in City's commercial and civic areas.	Before December 31, 2011	Public Works
B	Install bicycle parking facilities in underserved areas (20% of total to be Class I or II bicycle parking facilities).	Before July 31, 2012	Public Works
C	Adopt an ordinance that requires new development to provide adequate bicycle parking for tenants and customers; and requires businesses with more than 30 employees to provide end-of trip facilities including showers, lockers, and Class I bicycle storage facilities.	Before July 31, 2012	City Council Public Works
Progress Indicators		**Target**	
i	Bicycle-parking to auto-parking ratio.	0.5:1 by 2015 1:1 parking by 2020	
ii	Percentage of businesses with over 30 employees with end-of-trip facilities.	100% by 2020	

Measure TL 1.4:	Evaluate the potential for mixed-use development within Piedmont's existing commercial centers.		
Action		**Timetables**	**Responsibility**
A	Identify the potential for high-quality, pedestrian-oriented, mixed-use development within the Civic Center Master Plan.	Before December 31, 2012	Public Works
B	Prepare a Specific Plan for the Grand Avenue commercial area that identifies the potential for high-quality, pedestrian-oriented, mixed-use development.	Before December 31, 2015	Public Works
C	Develop small business incentive programs to encourage new neighborhood-serving uses in the Civic Center and Grand Avenue commercial areas.	Before December 31, 2012	Public Works
D	Conduct audit of land use, zoning, development standards, and other regulations that may act as barriers to neighborhood serving businesses and mixed-use development.	Before December 31, 2011	Public Works
Progress Indicators		**Target**	
i	Number of new neighborhood-serving commercial amenities (e.g. restaurants, bakeries, retail stores, medical offices, etc) in City since 2009.	3 by 2015 10 by 2020	

Measure TL 2.1:	Work with AC Transit to conduct a public transit gap study and provide bus stops with safe and convenient bicycle and pedestrian access and essential improvements.		
Action		**Timetables**	**Responsibility**
A	Consult with AC Transit to ensure Piedmont bus stops provide shade, weather protection, seating, lighting, and route information.	Before December 31, 2017	Public Works
B	Conduct a study of bicycle and pedestrian access to transit stations.	Before July 31, 2012	Public Works
Progress Indicators		**Target**	
i	Percentage of bus stops with shade, weather protection, seating, lighting, and route information.	80% by 2015 100% by 2017	

Funding Strategies

This section describes potential funding sources and strategies that Piedmont could pursue to cover many of the costs related to the CAP. Though the City will not be the sole entity paying for CAP measures, only the relative likely public costs of each measure have been identified, not those borne by individuals or businesses.

Preliminary estimates indicate that full implementation of the CAP would cost the City approximately $456,000 per year through 2020. Because the CAP is proposed to be implemented gradually between 2010 and 2020, the full annual cost would not be realized until the latter years of the program.

The CAP will require strategic public funding by the City, by regional government agencies, and by the state and federal governments to provide capital projects, incentives, outreach/education, and new regulations necessary to achieve the plan's objectives. To decrease costs and to improve the plan's efficiency, actions should be pursued concurrently whenever possible.

Funding sources have not been identified for all actions. However, numerous state and regional grants are available to assist with funding some of the more expensive strategies. In addition, Piedmont can and should partner with Alameda County and other nearby jurisdictions to administer joint programs as feasible. As many businesses in the Bay Area are leaders in renewable energy and green infrastructure, potential opportunities to partner with the private sector to decrease the costs of implementation abound. Finally, many of the measures and actions have the potential to be self-financing if properly designed and implemented. Appendix C provides a summary of key assumptions underlying the cost analysis.

State and Regional Grants

Of all of the strategies in the CAP, the Transportation and Land Use Strategy is the most expensive, as it requires the creation of new pedestrian and bicycle infrastructure. Fortunately, numerous regional and state grants are available to assist with transportation improvements.

Transportation Fund for Clean Air

The Transportation Fund for Clean Air (TFCA) is a Bay Area Air Quality Management District (BAAQMD) grant program funded by a surcharge on motor vehicles registered in the Bay Area. The purpose of the TFCA program is to provide grants to support Bay Area projects that will decrease motor vehicle emissions and thereby improve air quality. It funds a wide range of project types, including the purchase or lease of clean air vehicles; shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle racks, and lockers; arterial management improvements to speed traffic flow on major arterials; smart growth projects; and projects that enhance the availability of transit information.

Safe Routes to Transit

Regional Measure 2, the $1.00 bridge toll increase, funds projects that enhance pedestrian and bicycle access to transit stations. TransForm is administering the program. Funding cycles are approximately every two years.

Livable Communities & Housing Incentive Program

The Metropolitan Transportation Commission (MTC) Transportation for Livable Communities (TLC) program provides technical assistance and capital grants to help cities, neighborhoods, transit agencies, and nonprofits develop transportation-related projects that improve walking and bicycle access to public transit stations, major activity centers, and neighborhood commercial districts.

Safe Routes to Schools

Safe Routes to School is an international movement focused on increasing the number of children who walk or bicycle to school by funding projects that remove barriers that currently prevent them from doing so. Those barriers include lack of infrastructure, unsafe infrastructure, lack of programs that promote walking and bicycling through education/encouragement programs aimed at children, parents, and the community. In California, two separate Safe Routes to School programs are available. One is the State program referred to as SR2S. The other is the federal program referred to as SRTS. Both fund qualifying infrastructure projects.

Alameda County Transportation Improvement Authority Measure B

Measure B (2000) funds millions of dollars worth of local transportation improvements in every Alameda County jurisdiction. These are the most flexible Measure B funds and can be used for local transportation priorities. Viable uses of Measure B funds include street and road improvements; transit, bicycle, and pedestrian improvements beyond those funded with Measure B Bicycle and Pedestrian Funds; and encouraging transit use instead of cars.

American Recovery and Reinvestment Act Funding

CaliforniaFIRST: Property Assessed Clean Energy (PACE)

AB 811, passed in July of 2008, allows local governments to form assessment districts that allow property owners to install renewable energy and energy efficiency improvements on their properties and pay for the cost of the projects over time. This bill allows land-secured loans for homeowners and businesses who install energy-efficiency projects and clean-energy generation systems, to be paid back through assessments on individual property tax bills. If the property is sold, the outstanding loan balance is taken over by the new

owner. AB 811 means property owners can avoid up-front installation costs, while at the same time requiring little or no investment of local government general funds. AB 811 has wide applicability to many measures in the CAP, especially measures that require some private investment on the part of the residents or local businesses.

The CaliforniaFIRST Program is a property assessed clean energy (PACE) finance program, which is enabled through the AB 811 legislation. This program allows property owners within participating regions to finance the installation of energy and water improvements on their home or business and pay the amount back as a line item on their property tax bill. The CaliforniaFIRST Program is sponsored by the California Statewide Communities Development Authority (California Communities), an association of counties and cities, in partnership with Renewable Funding and the Royal Bank of Canada Capital Markets.

Pursuant to AB 811, property owners may finance energy efficiency and renewable energy projects that are permanently affixed to the property. Recent legislation, AB 474, expanded the Program's reach to include the financing of water efficiency projects. Eligible projects under the CaliforniaFIRST Program may include but are not limited to air sealing, wall and roof insulation, energy efficient windows, tankless water heaters, solar photovoltaics, and low-flow toilets.

California Communities intends to extend CaliforniaFIRST to include all interested counties and cities following a successful pilot.

California Energy Commission Energy Efficiency Financing

The California Energy Commission offers low interest loans for public institutions to finance energy efficient projects and programs. Interest rates are currently at between one and three percent. Projects with proven energy and/or capacity savings are eligible, provided they meet the eligibility requirements for ECAA loans. Examples of projects include:

- Lighting systems
- Pumps and motors
- Streetlights and LED traffic signals
- Automated energy management systems/controls
- Building insulation
- Energy generation including renewable and combined heat and power projects
- Heating and air conditioning modifications
- Waste water treatment equipment

Loans for energy projects must be repaid from energy cost savings within 15 years, including principal and interest (approximately 13 years simple payback for the 1% interest rate funding and approximately 11 years simple payback for

the 3% interest rate funding). Simple payback is calculated by dividing the dollar amount of the loan by the anticipated annual energy cost savings.

Only project-related costs with invoices dated after loans are officially awarded by the Energy Commission at a Business Meeting are eligible to be reimbursed from loan funds. The funds are available on a reimbursement basis. The final 10 percent of the funds will be retained until the project is completed. Interest is charged on the unpaid principal computed from the date of each disbursement to the borrower. The repayment schedule is up to 15 years and will be based on the annual projected energy cost savings from the aggregated projects.

Energy Efficiency and Conservation Block Grant (EECBG)

The California Energy Commission has developed guidelines to help implement and administer the Energy Efficiency and Conservation Block Grant Program (EECBG Program) for small cities and counties that did not receive an initial allocation through the program. Thus, the City of Piedmont qualifies for this competitive application program. The purpose of the EECBG Program is to implement projects and programs that will:

- Reduce fossil fuel emissions in a manner that is environmentally sustainable, and to the maximum extent practicable maximize benefits for local and regional communities.
- Reduce total energy use.
- Improve energy efficiency in the building sector, the transportation sector, and other appropriate sectors.

As established by Assembly Bill 2176, which grants the Energy Commission authority to administer the EECBG Program, the CEC must prioritize cost effective energy efficiency projects, which are defined as projects that achieve minimum energy savings per dollar spent (10 million source British Thermal Units (BTUs) per each $1,000 spent). Dollars spent/project costs include only EECBG funds. No utility rebates or incentives, loan funding, or other potential sources of matching funds may be considered in the dollars spent/project cost when calculating this cost effectiveness ratio.

In order to be eligible for funding under the EECBG Program, projects must meet the minimum criteria listed below. In addition to qualifying as a “small city”, the minimum criteria for funding eligibility include:

- Projects must focus on energy efficiency.
- Projects must be cost-effective as defined above.
- Projects must include a feasibility study that provides estimates of costs and energy savings.
- Project administration cost must be below five percent of the funding award received from the Energy Commission.
- Applicants must demonstrate ability to comply with state and federal reporting obligations, including documentation of jobs created and greenhouse gas impacts.

California Comprehensive Residential Building Retrofit Program

The California Comprehensive Residential Building Retrofit Program is a proposed program under the State Energy Program (SEP), which is administered by the California Energy Commission. As lead applicant and fiscal sponsor, ABAG, in partnership with participating local seeks to achieve the following objectives:

- Create competitive regional grant application that maximizes funding for Bay Area residential building retrofit programs by collaborating on program design and implementation
- Reduce program design and implementation costs for each participating County-wide program through shared activity (cross cutting tasks that benefit all Bay Area programs might include developing model program protocols and procedures, shared list of qualifying contractors, shared regional web-based project tracking system, tools and templates, consumer education resources, contract admin/reporting, etc.)
- Reduce confusion among contractors and homeowners with more program uniformity while maintaining City priorities.
- Leverage early adopter programs (e.g. Sonoma County, Alameda County, etc.) which will have developed tools and templates before SEP money has been released

ABAG will serve the role of facilitating cross cutting tasks that benefit all regional programs but the City would be responsible for implementing its specific scope of work.

Other Public Finance

Qualified Energy Conservation Bonds (QECBs)

A Qualified Energy Conservation Bond (QECB) is a tax credit bond. Issuers repay principal on a regular schedule, but generally do not pay interest. Instead, the holder of a QECB receives a federal tax credit in lieu of interest. The tax credit may be applied against the bond holder's regular and alternative minimum tax liability. The tax credit amount is treated as taxable interest income to the holder of the bonds. For example, if the tax credit amount is $100 and the holder is in the 35% tax bracket, the credit provides a $65 benefit to the holder. Under this program, QECBs must be issued by the end 2010.

The proceeds of the Qualified Energy Conservation Bonds can be used for one or more or the following "qualified conservation purposes":

a) Type I: Capital expenditures incurred for purposes of (i) reducing energy consumption in publicly-owned buildings by at least 20 percent, (ii) implementing green community programs (including the use of loans, grants, or other repayment mechanisms to implement such programs), (iii) rural development involving the production of electricity from renewable

energy resources, or (iv) any qualified facility eligible for the production tax credit under Section 45 of the IRS Code.

b) Type II: Expenditures with respect to research facilities, and research grants, to support research in: (i) development of cellulosic ethanol or other non-fossil fuels; (ii) technologies for the capture and sequestration of carbon dioxide produced through the use of fossil fuels, (iii) increasing the efficiency of existing technologies for producing non-fossil fuels; (iv) automobile battery technologies and other technologies to reduce fossil fuel consumption in transportation, or (v) technologies to reduce energy use in buildings.

c) Type III: Mass commuting facilities and related facilities that reduce the consumption of energy, including expenditures to reduce pollution from vehicles uses for mass commuting.

d) Type IV: Demonstration projects designed to promote the commercialization of (i) green building technology; (ii) conversion of agricultural waste for use in the production of fuel or otherwise; (iii) advanced battery manufacturing technologies; (iv) technologies to reduce peak use of electricity; or (v) technologies for the capture and sequestration of carbon dioxide emitted from combining fossil fuels in order to produce electricity.

e) Type V: Public education campaigns to promote energy efficiency.

Clean Renewable Energy Bonds (CREBs)

Renewable energy projects, when compared to conventional generation facilities, are much more expensive and not economically feasible for many electric cooperatives. By providing low-cost loans through the Clean Renewable Energy Bonds (CREBs), this program aims to make renewable energy projects more affordable to the rural communities the electric cooperatives and public power systems serve.

CREBs are part of the Energy Policy Act of 2005 signed into law on August 8, 2005. It is a program designed to give electric cooperatives and public power systems an incentive to develop clean, renewable energy sources by providing very low-cost capital. It is designed to provide a similar incentive to the production tax credit (PTC) program currently offered to private investors and IOUs.

Under the Energy Policy Act, a qualified issuer, such as an electric cooperative or cooperative lender, can issue CREBs. Then, instead of the issuer paying interest to the bondholder, the federal government provides a tax credit to the bond purchaser. The proceeds from these bonds are then available to finance new renewable energy projects. Electric cooperatives, or public power suppliers, can apply for a low-cost loan for a qualified renewable energy project. (Electric cooperatives and public power entities can also issue CREBs.)

The same projects that qualify under the production tax credit program are eligible under this program. Here are just a few examples:

- Solar
- Wind

- Closed-loop biomass
- Refined coal production
- Small irrigation power
- Landfill gas
- Qualified hydropower

Infrastructure State Revolving Fund Program

The Infrastructure State Revolving Fund Program provides direct low cost loans for local governmental public infrastructure.

Infrastructure projects to be financed can include:

- Streets
- Highways
- Environmental Mitigation Measures
- Parks and Recreational Facilities
- Public Transit
- Solid Waste Collection and Disposal

The City of Piedmont can consider applying for these low-interest loans to implement a wide range of measures and activities in the CAP. In particular, the transportation and waste related measures could seek financing through this program. Loans are available in amounts ranging from $250,000 to $10 million per applicant for Tier 1 loans, and $250,000 to $2.5 million per applicant for Tier 2 loans (tier system based on evaluation of project impact – the greater the project impact, the higher the cap on available funds).

Partnerships with Private Companies and Other Organizations

The Bay Area is home to numerous private companies who provide renewable energy or green infrastructure. The success of the CAP depends in part on collaboration between these businesses and the City and/or public. Both Better Place (located in Palo Alto) and Coulomb Technologies (located in Campbell) are developing electric plug-in auto charging station infrastructure throughout the Bay Area. Pacific Gas and Electric (PG&E) and the East Bay Municipal Utility District (EBMUD) also administer numerous energy efficiency and water conservation programs that the City can leverage and help advertise to residents. Solar companies will also be an important asset to the CAP, as the advent of the Power Purchase Agreement (PPA) enables businesses, residents, and the City to install solar panels and access solar power at no cost. Partnering with these businesses, as well as new businesses as they arise, will enable the City to both save money and provide the community with the most up-to-date green infrastructure.

Power Purchase Agreements

Renewable energy has become increasingly more accessible and cost-effective due to Power Purchase Agreements (PPAs). In a PPA, a private company or third party installs a renewable energy technology, often solar panels, at no cost to the consumer and maintains ownership of the installed panels, selling customers the power produced on a per kilowatt-hour basis at a contractually established rate. The rate is often lower than what customers pay their utility today, and the rate increases at a fixed percentage (usually 2.5 to 4.0 percent) annually. In addition to installing the panels, the third party monitors and maintains the systems to ensure that they keep working. The contract period for a PPA is typically 15 years, at which point the third party will either uninstall the panels or sign a new agreement with the building owner. These agreements are ideal for either demonstration projects implemented by the City, or for residents or businesses with interests in reducing the energy consumptions in their homes and businesses.

Energy **Performance** Contract with Energy Service Provider

Energy services performance contracting is a common way to implement energy efficiency improvements and frequently covers financing for the needed equipment. An energy services performance contract would be an agreement between the City of Piedmont and an energy services provider (ESP). The ESP would implement a renewable energy or energy efficiency program and guarantees that the energy savings will meet or exceed annual payments to cover all project costs.

Typical projects include;

- Lighting
- Heating, air conditioning and ventilation
- Control systems
- Building envelope improvements (insulation, roofs, windows, etc.)
- Cogeneration and CHP
- Demand Response
- Renewables and biomass
- Water and sewer – metering and use reduction
- Sustainable materials and operations

If the savings do not materialize, the ESP pays the difference. Performance contracts tend to contain three elements: a project development agreement, and energy services agreement, and a financing agreement.

Energy Savings Performance Contracting (ESPC)

The basic concept of the Energy Savings Performance Contract (ESPC) is that an Energy Services Company (ESCO) guarantees the amount of energy saved, and further guarantees that the value of that energy would be sufficient to make the

debt service payments as long as the price of energy does not fall below a stipulated floor price. The main elements of the guaranteed savings are:

- The amount of energy saved is guaranteed
- The value of energy saved is guaranteed to meet debt service obligations down to a floor price
- The City carries the credit risk
- A smaller piece of the investment package goes to "buy" money
- Tax-exempt institutions can use their legal status for much lower interest rates
- ESCO carries only the performance risk

Typically, an ESPC project would have a simple payback of 10 years or less to allow for the cost of money and other fees to be included in the overall project payback. Lending institutions look for less than 15 years including all fees.

Typical projects include:

- Energy management systems
- Interior and exterior lighting
- Boiler replacement and repair of steam distribution systems
- High-efficiency HVAC systems
- LED traffic systems
- Wastewater treatment plant pumps and motors

On-Bill Financing

Through partnering with PG&E, the City could facilitate the repayment of loans for efficiency upgrades on utility bills. PG&E is in the process of implementing a pilot on-bill financing program for small businesses. The system could function in one of two ways: through loans or tariffs. A loan is assigned directly to the customer who must pay it back even if he moves. In contrast, the tariff approach links the charge to the meter, meaning that whoever lives at the house or owns the business pays the fee. If the customer moves, the new occupant picks up the payment. The tariff approach allows for a long payment term and therefore lower monthly costs. It also encourages renters to participate in the program because they only pay for energy saving measures while they benefit from them, and remain in the premises.

Upgrades would be selected by the building owner (in coordination with the City) such that the efficiency savings would pay for the investment over a fixed period of time. Customers would "share" monthly energy efficiency savings with the utility until the loan is paid back, at which point all savings would be reflected in lower monthly bills.

The goal is to simplify loan repayment and (in combination with a funding source) reduce upfront cash outlay by property owners. In addition, some models of on-bill financing would allow for the loan to remain with the property

(even if sold by the current owner), thereby sharing the cost of upgrades over time with future beneficiaries of those upgrades.

Energy Efficiency Mortgages

Energy Efficiency Mortgages can provide owners additional financing (whether at time-of-sale or upon refinancing) for energy efficiency improvements at discounted interest rates. Energy efficiency upgrades could be chosen that would allow owners to realize a net monthly savings. The goal is to provide capital for energy efficiency upgrades at a discounted interest rate. Large public organizations such as ENERGY STAR and traditional lending institutions offer energy efficient mortgages.

ENERGY STAR mortgages encourage comprehensive energy efficiency improvements to new and existing homes by increasing the affordability and availability of energy efficiency mortgages for homeowners and homebuyers. This pilot mortgage pilot program offers borrowers an opportunity to lower their energy consumption while making significant, affordable improvements to their homes. These mortgages include the cost of energy efficiency investments in the loans themselves so that borrowers can pay for those investments over the life of their loans, as well as deduct the interest from their federal and state income taxes. One of the key benefits of an ENERGY STAR mortgage is that a borrower can finance energy-saving improvements to their homes without paying more than they would for a typical mortgage.

Partnerships with Other Jurisdictions

As Piedmont is a relatively small city, partnering with neighboring jurisdictions is another key implementation strategy supporting the CAP. The Cities of Oakland, Emeryville, Berkeley, and Albany are the primary potential partners the City will pursue. Berkeley has been identified in the CAP as a potential partner in creating a food industry grease-to-biodiesel recycling program, and obtaining AC Transit EasyPasses for City employees, as the City of Piedmont alone is too small to qualify. Piedmont will also seek to partner with AC Transit to improve the public transit system, and with Alameda County to improve the energy efficiency of the City street lights.

Plan Adaptation and Evolution

The 2010 CAP represents the City's best attempt to create an organized, community-wide response to the threat of climate change at the time of preparation. The field of climate action planning is rapidly evolving. Over the next decade, new information about climate change science and risk is likely to emerge, new GHG reduction technologies and innovative municipal strategies will be developed, and State and federal legislation are likely to advance. In order to remain relevant and to be as effective as possible the CAP must evolve over time.

In combination with the annual monitoring and reporting requirements for individual measures and actions outlined in the matrices above, the CAP as a whole will be reviewed and modified every three years to identify potential plan

update needs. These reviews will evaluate improvements to climate science, explore new opportunities for GHG reduction and climate adaptation, and respond to changes in climate policy. The Council will consider other actions that may be required if necessary to insure that the City ultimately meets its GHG reduction goal. In 2012, the Council will review progress made toward reducing the community's GHG emissions and will consider modifying the adopted target.

As many of Piedmont's CAP measures will be implemented through the City's upcoming General Plan update, the first CAP review should occur following adoption of the General Plan. Furthermore, the CAP should be identified as an implementation program supporting achievement of land use, circulation, and conservation policies within the General Plan.

This page intentionally left blank.

Chapter V
Public Participation

Piedmont residents have played an important role in the formulation of this Climate Action Plan (CAP) and are vital to its success. The objective for the community participation has been to provide initial direction for the Plan, highlight local issues and opportunities that could reduce greenhouse gases (GHGs), and provide comments on the draft. Community support for the CAP is critical to its success, and community members will need to take an active role in implementing the Plan and monitoring its effectiveness over time.

Outreach Methods

A variety of outreach tools allowed all who wished to participate to do so in a manner with which they felt comfortable. Outreach efforts included meetings with the City's Environmental Task Force (ETF), an informative PowerPoint presentation available to organizations and individuals throughout the City, a web-based community survey, and a community workshop. A brief summary of each activity follows. Copies of various outreach materials are also provided in Appendix B.

Environmental Task Force

In May 2008, the City Council established the ETF to identify achievable short-term and long-term actions that the City and its residents could take to improve the community's environmental performance. The ETF's primary task was to develop educational and public outreach programs and other non-regulatory means to encourage recycling, solid waste diversion, and reduction of energy consumption by residents and to develop energy saving programs for City operations and facilities. As a result of these activities, the ETF was ideally suited to provide input to the CAP. Between 2008 and 2009, the ETF met three times to discuss the CAP preparation process. On August 26, 2008, the ETF reviewed the CAP scope of work and provided initial feedback and direction.

On December 17, 2008, the ETF reviewed preliminary results from the Community Climate Action Survey. On March 24, 2009, the ETF reviewed preliminary draft CAP strategies and measures and provided valuable information and opinions about community concerns, desires, and context. Community members also attended to offer meaningful input which was used to craft CAP strategies and measures.

Community PowerPoint Presentation

The City and consultants prepared a PowerPoint presentation that was used by City staff to describe the preparation of the CAP to groups and organizations throughout the community. The presentation defined the challenges and opportunities of climate action; described why taking action now matters both locally and globally; presented California's legislative framework for climate change planning; defined the proposed process for completing Piedmont's CAP; and reviewed best practices used in other jurisdictions to reduce GHGs associated with land use, transportation, green building, energy efficiency, renewable energy, water conservation, recycling and waste, and public outreach. The presentation concluded by presenting actions individuals could take now to reduce their carbon footprint how people could participate in formulating the CAP. A copy of the PowerPoint presentation is provided in Appendix B.

Climate Action Survey

The City also sponsored an online climate action survey between October 2008 and June 2009 to provide input for the CAP. Over 190 responses to the survey were received. The survey consisted of 21 questions regarding transportation choices, home and business energy use, community shopping and services, renewable energy, water conservation, waste reduction. The survey also asked residents to identify the level of support they would offer the City with regard to implementing mandatory requirements versus incentive-based programs to achieve GHG reductions and concluded with a series of demographic questions

regarding each respondent's age, whether they own or rent property within the City, and their annual income.

Key Findings

Although the number of responses received does not achieve statistical significance, responses to the survey still provide valuable insights into community opinion. Copies of the survey questionnaire and June 2009 results are provided as attachments to this chapter. Following are some of the key survey findings.

Demographics

Few survey respondents were under 34 years of age or over 65 years of age. This suggests a need for additional outreach within these communities as the CAP is implemented. Both groups can play important roles in implementing the CAP through a youth/senior Green Corps programs.

18. To what extent would you support City-led efforts to meet mandated greenhouse gas emissions targets? (select one)

	Response Percent	Response Count
I would not support the efforts at all.	10.1%	17
I would support voluntary incentive-based measures, but that is all.	**39.6%**	**67**
I would support the City in creating mandatory requirements in order to meet the targets.	31.4%	53
I would support mandatory requirements and increased taxes in order to meet the targets.	18.9%	32
answered question		169
skipped question		23

Need for Climate Action

The majority of respondents stated that they support City-led efforts to address climate change and reduce community GHGs. Approximately half of all respondents indicated support for City efforts to create mandatory requirements versus incentive-based approaches. Only 19% of respondents, however, indicated a willingness to pay higher taxes to support these efforts.

Transportation

The private car was the predominant travel mode for most respondents, but other travel modes were also used (i.e., carpool, bike, walk, public transit). Notably, 14% of respondents stated that carpooling was their primary method of commuting. Working from home was a low-carbon option for about 20% of respondents.

Public transit played only a minor role in respondents' transportation choices. More than 80% of respondents indicated they ride public transit "monthly", "only a few times a year", or "never." Respondents generally found transit use inconvenient compared to private automobile use, citing that driving is faster, safer, and more accessible to a variety of locations. Shuttles to/from residential neighborhoods and job sites, car share programs, additional stops with more amenities, and additional shopping and employment centers near Bay Area Rapid Transit (BART) stops were all suggested as potential options to improve the appeal of public transit.

Roughly half of the respondents walked or biked to purchase daily goods and services. More respondents indicated they would walk/bike if the City helped to improve sidewalk and bike path quality and safety, and decrease distance to and increase the diversity of destination shops and service centers.

Building Energy

Respondents acknowledged the benefits of energy efficiency measures for GHG reductions, cost-savings, and quality of life improvements. Respondents provided strong support for new regulations that would require increased energy efficiency in new construction and major remodels, market-based incentives, and voluntary measures that produce co-benefits.

Approximately 60% of respondents indicated that they do not believe the City should require that buildings be retrofitted to a higher level of energy efficiency at the time of resale, or major additions and remodels. Just over half of the respondents said that the City should provide low-interest loans to property owners who want to retrofit their homes or businesses to be more energy efficient. However, numerous respondents pointed out that current economic conditions and home affordability should be taken into account, and that such programs should not add major expenses for those trying to buy, sell, or remodel a home.

With regard to their own potential home energy-efficiency improvements, respondents favored low-cost measures (e.g., changing out traditional light bulbs with compact fluorescents). In general, more expensive and slower-payback measures (e.g., solar hot water heaters, or solar panels) had lower levels of support. As these are important for achieving GHG reduction targets, then the City needs to work to: a) remove financial barriers, and b) provide public education to inform residents about potential financial benefits.

Water Conservation and Waste Reduction

Respondents offered very strong support for water conservation and waste reduction measures, even for mandatory regulations and behavior changing measures. Strong support was offered for credits on water bills if a household uses less than an established number of gallons per month; requirements for new construction and major remodels/additions should to use the lowest water consuming appliances available; and City goals to become a zero-waste community.

Renewable Energy

More than 80% of respondents offered support for installing photovoltaic panels or wind turbines on municipal buildings/properties, so long as they are cost-effective. Approximately 36% of respondents expressed interest in photovoltaic panels or solar hot water heaters for homes or commercial buildings. Approximately 60% supported spending extra on monthly utility bills to offset GHG emissions associated with home energy use. The majority of respondents did not support the installation of wind energy generation facilities within Piedmont.

City Council Hearings

The City Council hosted numerous public hearings related to development of the Climate Action Plan. Key hearings and topics included the following:

- April 6, 2009 – Public Hearing to receive presentation regarding factors to consider in setting a GHG reduction target.
- April 20, 2009 – Public Hearing to establish a GHG reduction target of 15% below 2005 emission levels.
- January 4, 2010 – Public hearing to receive comments on Draft Climate Action Plan.
- March 15, 2010 – Public hearing to adopt Climate Action Plan.

Community Workshop

The City also hosted a CAP community workshop on May 27, 2009. The workshop focused on proposed GHG reduction strategies and measures to be contained in the Draft CAP. The workshop objective was to receive public comment and examine preliminary levels of support for each key strategy and measure. The workshop consisted of a PowerPoint presentation and several stations outlining proposed Climate Action Plan measures.

Discussions at the workshop focused on the potential of expanding bicycle infrastructure, the need to enhance Safe Routes to School programs, increasing carpooling in the community, the desire to increase public transit service, and concern regarding potential costs of a Residential Energy Conservation Ordinance to homeowners.

Attachments

The following materials are provided in Appendix B to document the public outreach process for the CAP. All materials associated with the outreach program are available for review at the Piedmont Public Works Department.

- Community PowerPoint presentation, “Climate Change: How can Piedmont be part of the solution?”
- Climate action survey questionnaire
- Climate action survey results – July 30, 2009

This page intentionally left blank.

Appendix A.

Climate Action Plan Strategies Calculations Detail and Assumptions

APPENDIX A: CLIMATE ACTION PLAN STRATEGIES CALCULATIONS DETAIL AND ASSUMPTIONS

The following section summarizes the assumptions and parameters used to derive greenhouse gas (GHG) emission reduction performance of each of the City of Piedmont's Climate Action Plan strategies and programs.

Summary Table		
Measure Number and Title (paraphrased)	**Scaled % GHG Emission Reduction**	**GHG Emission Reduction (MT CO_2e/year)**
BE-1.1: Install cost-effective renewable energy systems on all City buildings and purchase remaining electricity from renewable sources.	1.96%	920
BE-2.1, BE-2.2, BE-2.3: Residential energy efficiency retrofit, and related finance and outreach programs	9.07%	4,260
BE-3.1, BE-3.2, BE-3.3: Non-residential energy efficiency retrofit, and related finance and outreach programs	0.08%	40
BE-4.1: Consider requiring energy performance in new construction if necessary.	0.05%	20
BE-5.1: Renewable energy program	3.46%	1,620
BE-6.3: Comparative utility bill	0.33%	160
WW-1.1: Waste reduction	2.93%	1,380
WW-2.2 and WW-2.3: Outdoor water conservation	1.63%	770
TL-1.1: Consider expanding and enhancing bicycling and pedestrian infrastructure	0.90%	420
TL-1.2: Bicycle parking	0.39%	180
TL-1.3: Pedestrian-friendly centers	0.12%	60
TL-1.4: Mixed-use commercial centers	0.06%	30
TL-2.1: Improved bus stops and access	0.15%	70
TL-3.5: Public education programs	0.10%	50
Total (% relative to 2020 emissions projections)	21.22%	9,980
Total (% reduction from 2020 projections relative to 2005 emissions)	**22.56%**	**9,980**

Note: Values may not appear to add exactly due to rounding.

Municipal Building Energy Efficiency and Renewable Energy

Measure BE-1.1: Install cost-effective renewable energy systems on all city buildings and purchase remaining electricity from renewable sources.

This measure would convert all city-building electricity consumption to electricity from renewable energy sources. The measure assumes that the City would conduct energy efficiency upgrades, install cost-effective renewable energy systems, and then meet any additional energy demands by purchasing

electricity from renewable sources (e.g., PG&E, or others if community choice aggregation is pursued). The amount of reduction achieved by this measure is based on the City's electricity consumption data from the baseline year 2005.

Measure value = 920 MT/year

Sources of information:
Local Governments for Sustainability (ICLEI). 2008. City of Piedmont 2005 GHG Inventory. Oakland, CA.

Residential Energy Efficiency Retrofit

Measure BE-2.1: Consider developing and implementing point-of-sale residential energy and water efficiency upgrade requirements and/or incentives if necessary.

Measure BE-2.2: Identify and consider developing financial incentives and low-cost financing products and programs that encourage investment in energy efficiency and renewable energy within existing residential buildings.

As the economy improves and related programs are developed, the City will consider adopting a Residential Energy Conservation Ordinance. Upon adoption, this ordinance would require all homes sold or re-sold within the City to install an energy efficiency package to reduce electricity and natural gas consumption. The energy efficiency package includes duct sealing, programmable thermostats, attic insulation, water heater insulation, air seals, and hot water pipe insulation. The average GHG reduction per home was estimated by Stopwaste.org using the MICROPAS building energy model. The number of homes sold or re-sold in the City between 2005 and 2020 was estimated to be 32% using annual home sales data from 2000 (EDAW, 2009). An additional 23% is estimated to result from voluntary retrofits encouraged through public outreach and education programs.

Unscaled Measure Performance (metric tons CO_2e reduced per residential unit)	Number of existing Piedmont Residential Homes	Participation Rate	GHG Emissions Reduction (MT/year)
2	3,885	55%	4,260

Sources of information:
Pers Comm. Sommer, Wendy. 2009. Email to Kevin Jackson, City of Piedmont regarding the GHG reductions associated with installation of Stopwaste.org's energy efficiency package (April 2009).

Non-residential Energy Efficiency Retrofit

Measure BE-3.1: Consider developing and implementing point-of-sale commercial energy efficiency upgrade requirements and/or incentives if necessary.

Measure BE-3.2: Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.

This measure would improve energy efficiency of commercial buildings by retrofitting existing structures to green building code standards. This would result in a 12% improvement for both natural gas and electricity consumption.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
12%	2.2% (Electricity)	24%	0.06%	30
12%	0.7% (Natural gas)	24%	0.02%	10
Total			**0.08%**	**40**

Sources of information:
California Energy Commission [CEC] 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings;
California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Measure BE-4.1: Consider adopting additional standards for energy and water efficiency if necessary.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Inventory (MT GHG/year from new growth)	GHG Emissions Reduction (MT/year)
16.94% (residential electricity)	106	14
9.36% (residential natural gas)	52	5
7.32% (non-residential electricity)	7	1
3% (non-residential natural gas)	0	0
Total		**20**

Sources of information:
California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Measure BE-5.1: Develop a comprehensive renewable energy financing and informational program for residential and commercial uses.

It was assumed that 100% of electricity would be generated by renewable energy for all participating (assumed 10%) units from solar panels and a 70% reduction in natural gas would occur for solar water heating.

Strategy	Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Sub Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
Solar panels	100%	18.41% (electricity)	-	10%	1.84%	880
Solar water heaters	70%	36.34% (natural gas, residential)	60%	10%	1.53%	730
	70%	0.67% (natural gas, non-residential)	40%	10%	0.02%	10
Total					**3.39%**	**1,620**

Measure BE-6.3: Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.

As part of this measure, PG&E and EBMUD would provide comparative energy consumption data for neighborhoods within individual energy bills. The energy bills will include both energy and water efficiency measures that customers can implement and other ways to reduce energy and water consumption. This type of comparative energy billing was found to reduce energy consumption by 2% over the course of a year.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Residential Electricity)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
2%	16%	100%	0.33%	160

Sources of information:
Tsui, Bonnie. 2009 (July/August). Greening With Envy. The Atlantic. Available: <http://www.theatlantic.com/doc/200907/green-envy>.

Waste Reduction

Measure WW-1.1: Establish a zero-waste target for 2030, and work with Alameda County, neighboring cities, and other organizations to leverage the zero waste effort.

The GHG emissions reduction associated with this measure were calculated using the ICLEI CACP software. The CACP software contains nation-wide emission factors for various categories of waste. As discussed in Chapter IV Baseline, the percent distributions of waste categories from the *Alameda County Waste Categorization Study* were used to calculate GHG emissions using the CACP software. Waste categories from the *Alameda County Waste Categorization Study* were combined to better match the CACP software categories. The reduction in waste disposal (tons) from 2005 levels to projected 2020 levels (i.e., 80% below 1990 baseline) was used to calculate total GHG emission reductions. Waste categorization percentages were assumed to remain constant from 2005 to 2020.

Measure performance = 1,380 MT/yr

Water Conservation

Measure WW-2.3: Develop a water efficient landscaping ordinance to implement the California Water Efficient Landscaping Ordinance and to require or facilitate use of greywater or rainwater collection systems in new construction.

This measure was assumed to result in an approximately 50% reduction in outdoor water consumption. According to the California Department of Water Resources, approximately 74% and 58% of water consumption for single and multi-family residential uses, respectively, is associated with outdoor consumption. Approximately 12% of water consumption is for outdoor use associated with commercial uses.

Unscaled Measure Performance (% reduction in GHG emissions)	Consumption Scale Factor (Outdoor Consumption)	Emissions Sector (Water)	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
50%	74% (single-family)	2.22%	0.82%	395
50%	58% (multi-family)	2.22%	0.64%	310
50%	12% (commercial)	2.22%	0.13%	65
Total			**1.60%**	**770**

Sources of information:
Department of Water Resources. 2001. Statewide Indoor/Outdoor Split. Accessed December 2, 2008. Available: <http://www.landwateruse.water.ca.gov/annualdata/urbanwateruse/2001/landuselevels.cfm?use=8>.

Transportation and Land Use

Measure TL-1.1: Consider expanding and enhancing bicycling and pedestrian infrastructure throughout the community if financially feasible and practical.

Depending on the level of implementation of this measure, the performance in vehicle trip and vehicle miles traveled reduction can range from 1% to 5%. It was assumed that infrastructure enhancement would be met on approximately 60% of streets in Piedmont, and the performance of this measure would correspond to the middle end of the range (i.e. 3%). Class I Cycle track systems would be implemented on several streets in Piedmont handling approximately three-quarters of average daily vehicle trips. 3% was scaled by a participation rate of 77%, which is the amount of community-wide vehicle trips that would be eligible to be addressed by this measure.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
3%	38.30%	77%	0.88%	420

Sources of information:
Dierkers, G., E. Silsbe, S. Stott, S. Winkelman, an M. Wubben. 2007. CCAP Transportation Emissions Guidebook. Center for Clean Air Policy. Washington, D.C. Available: <http://www.ccap.org/safe/guidebook.php>. as cited in California Air Pollution Control Officers Association (CAPCOA) 2008. CEQA and Climate Change.
City of Piedmont. 2008. Public Review Draft General Plan, Transportation. Table 4.2: Daily Traffic Counts.

Measure TL-1.2: Install bicycle racks in commercial and civic areas of the City where racks do not currently exist.

This measure would require commercial buildings to provide end-of-trip facilities (i.e., showers and locker facilities, secure and covered bike parking) at commercial uses of at least 50 employees. This measure was expected to reduce commute-related vehicle trips, which was assumed to consist of 33% of trips, and associated GHG emissions by 1%

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
1.0%	38.30%	100%	0.38%	180

Sources of information:
Victoria Transport Policy Institute. 2009. Online TDM Encyclopedia (Bicycle Parking). Available: <http://www.vtpi.org/tdm/tdm85.htm>. Accessed 2009.
Rimpo and Associates. 2008. URBEMIS 2007 v.9.2.4. Urban Emissions Model. Available: http://www.urbemis.com.

Measure TL-1.3: Consider incorporating pedestrian-friendly design features into the City's civic and commercial centers.

The performance of this measure is related to the elasticity of design. The literature supports a 3% reduction in vehicle miles traveled for every 100% improvement in design. For Piedmont, it was assumed that this measure would address approximately 10% of the community.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.30%	38.30%	100%	0.11%	60

Sources of information:
Ewing, Reid, et al. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record 1780. Paper No. 01-3515 as cited in Urban Land Institute. 2008. Growing Cooler. ISBN: 978-0-87420-082-2. Washington, DC

Measure TL-1.4: Evaluate the potential for mixed-use development within Piedmont's existing commercial center.

The performance of this measure is related to the elasticity of increased diversity of uses. The literature supports a 5% reduction in vehicle miles traveled for every 100% increase in land use diversity. For the City, it was assumed that this measure would apply to approximately 3% of parcels in the community. (i.e., dispersing commercial uses in residential neighborhoods that currently do not have access to neighborhood serving retail).

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.15%	38.30%	100%	0.06%	30

Sources of information:
Ewing, Reid, et al. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record 1780. Paper No. 01-3515 as cited in Urban Land Institute. 2008. Growing Cooler. ISBN: 978-0-87420-082-2. Washington, DC

Measure TL-2.1: Work with AC Transit to conduct a public transit gap study and provide bus stops with safe and convenient bicycle and pedestrian access and essential improvements.

This measure was assumed to result in 0.5% reduction in vehicle trips and associated GHG emissions. It was assumes that approximately 25% of transit stops in Piedmont already have these features, so this measure would be applicable to the remaining 75% of transit stops.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.4%	38.30%	100%	0.14%	70

Sources of information:
Dierkers, G., E. Silsbe, S. Stott, S. Winkelman, an M. Wubben. 2007. CCAP Transportation Emissions Guidebook. Center for Clean Air Policy. Washington, D.C. Available: <http://www.ccap.org/safe/guidebook.php>. as cited in California Air Pollution Control Officers Association (CAPCOA) 2008. CEQA and Climate Change.

Public Education

Measure TL-3.5: Provide public education regarding reducing motor vehicle-related greenhouse gas emissions.

Measure BE-2.3: Educate residents about the availability of free home energy audit programs and encourage implementation of audit findings.

Measure BE-3.3: Partner with PG&E to provide a business education program that encourages commercial energy efficiency improvements.

Measure WW-2.1: Encourage residential and commercial users to participate in EBMUD's free water audit program.

This measure is related to the implementation of a comprehensive community-wide public education campaign to inform residents, businesses, and consumers about the incentive programs that would be implemented as part of the CAP designed to reduce GHG emissions. This measure is based on empirical data from a public education campaign designed to reduce emissions of criteria air pollutants in the Sacramento region (i.e., the Spare the Air program). The Sacramento region conducted an analysis of the effectiveness of the Spare the Air program as it relates to emission reduction. The analysis confirmed that approximately 1% of people changed their behavior (e.g., took fewer vehicle trips on Spare the Air days) as a result of the Spare the Air campaign.

For the City's public education campaign, it was assumed that approximately 1% of people would reduce their emissions from all sectors (e.g., transportation, electricity, natural gas, waste, water) by about 10%.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (All)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
10%	100%	1%	0.10%	50

Sources of information:
Based on SMAQMD 2009. Spare the Air Control Measure Program; Revision to State Implementation Plan Staff Report.

SB 107

SB 107 requires utilities to establish renewable energy portfolios of 20% by 2010, which would result in reduction of GHG emission factors associated with electricity generation and consumption. Because PG&E's energy portfolio is currently comprised of approximately 14% renewable energy, it was assumed that GHG emissions associated with electricity consumption in Piedmont would be reduced by 6% between the base year (2005) and 2020 associated with the implementation of this legislation. See Chapter IV for detailed discussion of emissions projections calculations.

2005 Emissions	Emissions Sector (electricity)	Scaled % Reduction	GHG Emissions Reduction (MT/year)
6%	18%	1.10%	530

AB 1493 (Pavley)

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. The CO_2 reduction associated with the implementation of AB 1493 is currently unknown. The ARB's AB 32 Scoping Plan

(the State's plan for implementing AB 32) expects approximately a 19.7% reduction in on-road mobile-source GHG emissions (ARB 2008[1]).

Because AB 1493 allows automakers two years lead time prior to the first model year of regulation, if AB 1493 were implemented in 2009, the earliest model year that would reasonably be expected to be regulated would be model year 2012.

It was assumed that AB 1493 would be 80% implemented by the year 2020 (allowing for two years of delay). Thus, the likely effect of AB 1493 on mobile-source GHG emissions in Piedmont was assumed to be approximately 15.76%.

Unscaled Emission Reduction	Sector (Transportation)	Scaled % Reduction	GHG Emissions Reduction (MT/year)
15.76%	38.30%	6.04%	2,894

[1] California Air Resources Board. 2008 (December). *Climate Change Proposed Scoping Plan*. Sacramento, CA. Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Last updated December 2008. Accessed May 18, 2009.

Piedmont GHG Emissions Baseline and Projection Summary

Sector	Subsector	Emission Source	GHG Emissions (metric tons CO_2e/year)					
			Year 2005		Year 2020		Year 2050	
Energy	Residential	Electricity	7,166	15.0%	7,794	16.6%	9,315	16.9%
		Natural Gas	16,869	35.3%	17,426	37.1%	18,907	34.2%
		Subtotal	24,034	50.3%	25,221	53.7%	28,222	51.1%
	Com/Ind	Electricity	933	2.0%	1,035	2.2%	1,336	2.4%
	Commercial	Natural Gas	306	0.6%	320	0.7%	357	0.6%
	Industrial	Natural Gas	151	0.3%	164	0.3%	198	0.4%
		Subtotal	1,389	2.9%	1,519	3.2%	1,891	3.4%
Transportation	Community	Gasoline	15,139	31.7%	15,519	33.1%	19,629	35.5%
		Diesel	3,954	8.3%	2,845	6.1%	4,145	7.5%
		Subtotal	19,094	40.0%	18,365	39.1%	23,773	43.0%
Waste	Community	Community	2,153	4.5%	777	1.7%	-	-
Water	Community	Community	1,084	2.3%	1,062	2.3%	1,353	2.4%
Total	**Total**	**Total**	**47,754**		**46,944**		**55,240**	

Piedmont GHG Emission Projections (2020 &2050)
Energy Consumption

Electricity and Natural Gas Consumption Projections					ICLEI Methodology						
		2005	2020	2050	Emission Factors				2005	2020	2050
Residential Energy	Units	Community-Wide	Community-Wide	Community-Wide	CO_2e	N_2O	CH_4	Units	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)
Electricity	kWh	32,055,282	35,068,945	41,909,757	0.49			lb/kWh	Provided By ICLEI	7,794	9,315
Natural Gas	therms	3,153,644	3,284,917	3,564,082	53.05			kg/MMBtu	Provided By ICLEI	17,426	18,907
Total Energy	MMBtu	424,768									
CO_2e	metric tons	24,033					Total tonnes CO_2e		Provided By ICLEI	25,221	28,222
		2005	2020	2050	Emission Factors				2005	2020	2050
Commercial/ Industrial Electricity	Units	Community-Wide	Community-Wide	Community-Wide	CO_2e	N_2O	CH_4	Units	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)
Electricity	kWh	4,173,291	4,654,509	6,009,150	0.49			lb/kWh	Provided By ICLEI	1,035	1,336
Natural Gas	therms	85,251									
Total Energy	MMBtu	22,768									
CO_2e	metric tons	1,389					Total tonnes CO_2e		Provided By ICLEI	1,035	1,336
		2005	2020	2050	Emission Factors				2005	2020	2050
Commercial & Industrial Natural Gas	Units	Community-Wide	Community-Wide	Community-Wide	CO_2e	N_2O	CH_4	Units	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)	Emissions (metric tons CO_2e/yr)
Com - NG	therms	57,118	60,337	67,329	53.05			kg/MMBtu	Provided By ICLEI	320	357
Ind - NG	metric tons	28,133	30,914	37,327	53.05			kg/MMBtu	Provided By ICLEI	164	198
CO_2e							Total tonnes CO_2e		Provided By ICLEI	484	555
Conversions			Global Warming Potentials		Sources:						
therm	MMBtu		N_2O	310	Strunin, Jonathan. Program Officer. ICLEI Local Governments for Sustainability U.S.A.. Oakland, CA. September 4,						
1	0.1		CH_4	21	2008a—email sent to George Lu of EDAW containing the final Piedmont GHG Inventory.						

Notes:
- kWh = kilowatt-hours; lb = pounds; kg = kilograms; MMBtu = million British thermal units; CO_2e = carbon dioxide equivalent

Piedmont GHG Emission Projections (2020 &2050)
Transportation

Calendar Year	2005			Emission Factors			
Category	Community Travel (miles)	Weighted Average Fuel Efficiency (mi/gal)	Fuel Consumption (gallons)	CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)	Total Emissions (metric tons CO_2e)
Gasoline VMT (miles)	31,992,104	19.1	1,674,979	8,599	0.070	0.062	15,139
Diesel VMT (miles)	2,482,146	6.4	387,835	10,092	0.050	0.042	3,955
Totals	34,474,250		2,062,815				19,093

Calendar Year	2020			Emission Factors			
Category	Community Travel (miles)	Weighted Average Fuel Efficiency (mi/gal)	Fuel Consumption (gallons)	CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)	Total Emissions (metric tons CO_2e)
Gasoline VMT (miles)	35,607,801	20.9	1,704,100	8,790	0.046	0.040	15,519
Diesel VMT (miles)	2,762,674	9.8	281,856	10,080	0.005	0.005	2,845
Totals	38,370,476		1,985,956				18,365

Calendar Year	2050			Emission Factors			
Category	Community Travel (miles)	Weighted Average Fuel Efficiency (mi/gal)	Fuel Consumption (gallons)	CO_2 (g/gal)	N_2O (g/mi)	CH_4 (g/mi)	Total Emissions (metric tons CO_2e)
Gasoline VMT (miles)	44,111,302	20.5	2,147,471	8,828	0.046	0.040	19,629
Diesel VMT (miles)	3,422,429	8.3	410,654	10,080	0.005	0.005	4,145
Totals	47,533,730		2,558,125				23,773

Source/Notes:
California Climate Action Registry (CCAR). 2009 (January). California Climate Action Registry General Reporting Protocol Version 3.1. Table C.4
Calendar year 2005 was estimated using emission factors provided by ICLEI
Calendar year 2020 and 2050 were estimated using EMFAC2007 Alameda County for Calendar Year 2020 and 2040
- mi = miles; gal = gallons; g = grams; CO_2e = carbon dioxide equivalent

Piedmont Local VMT Data
California Department of Transportation

Calendar Year	Daily VMT (1,000 miles)	Annual VMT (miles)	Annual Increase in VMT (%)
2001	91.93	33,554,450	
2002	104.68	38,208,200	13.9%
2003	98.74	36,040,100	-5.7%
2004	97.53	35,598,450	-1.2%
2005	94.45	34,474,250	-3.2%
2006	94.90	34,638,500	0.5%
2007	94.91	34,642,150	0.0%
Average Annual Growth Rate			**0.72%**

Source/Notes:
California Department of Transportation. 2007. Highway Performance Monitoring System (HPMS) Data Library: California Public Road Data 2001-2007. Available at: <http://www.dot.ca.gov/hq/tsip/hpms/datalibrary.php>. Accessed March 30, 2009. Last updated October 9, 2008
- VMT = vehicle miles traveled

Piedmont GHG Emission Projections (2020 &2050)
Waste Generation

	2005	2020	2050
	Community-Wide	Community-Wide	Community-Wide
Average Daily Cover (tons)	693	693	693
Community Wide (tons)	6,204	1,897	-
Total Waste Generation (tons)	6,897	2,590	-
metric tons CO_2e/year	2,153	777	-

Reductions	
Community-wide	
4,307	tons of waste Reduced (2005-2020)
1,376	metric tons per year CO2e reduced between 2005-2009

ABAG Population Projections

Year	Population	Waste (tons)	Average Daily Cover (tons)	Percent Reduction from Baseline
1990	10,602	9,486		
2000	10,952	5,411		
2005	10,984	6,204	693	65%
2008	11,000		693	
2020	11,069	1,897	693	80%
2030		949		90%

Stopwaste.org 2020 Solid Waste Goal and GHG Emissions	
Tons of Waste	1,897
metric tons CO_2e	777

Notes:
Average daily cover was assumed to stay constant due to the large variation in historical years.

Piedmont GHG Emission Projections (2020 &2050)
Water Consumption

Water Consumption Projections

Calendar Year	Population	Water Consumption (TGAL)	Water Consumption (MG)
2000	10,956	584,194	584
2005	10,984	547,869	548
2008	11,000	540,241	540
2020	11,066	595,156	595
2050	11,230	758,123	758

Note: Assumes annual average growth rate of 0.81% from 1990-2008 data.
0.81%

Calendar Year	Consumption (MG)	Energy Use (kWh/MG)	Total Energy (kWh)	Total Energy (MWh)	Emission Factors (lbs/MWh)						Total CO_2e ($MTCO_2e$/yr)
					CO_2	GWP	N_2O	GWP	CH_4	GWP	
2005	547.9	5,411	2,964,519	2,965	804.54	1	0.0037	310	0.0067	21	1,083.6
2020	595.2	5,411	3,220,390	3,220	724.12	1	0.0081	310	0.0302	21	1,062.3
2050	758.1	5,411	4,102,201	4,102	724.12	1	0.0081	310	0.0302	21	1,353.2

Notes:
- Baseline and projected energy consumption rates are from eGRID Subregion WECC California (CALI).
- Baseline water consumption GHG emissions calculated using eGRID2002 (CY 1990-2006) electricity emisison factors.
- Projected (2020 and 2050) water consumption GHG emissions calculated using eGRID2007 electricity emission factors.
- TGAL = thousand gallons; MG = million gallons; kWh = kilowatt-hours; MWh = megawatt-hours; $MTCO_2e$ = metric tons carbon dioxide equivalent

Appendix B.

Public Outreach

Climate Change: How can Piedmont be part of the solution?

City of Piedmont

Climate Action Plan

What does climate action mean for Piedmont?

Challenges

- Piedmont will need to:
  - Reduce greenhouse gas (GHG) emissions to stabilize climate change
  - Adapt to the unavoidable effects of climate change
  - Reduce fossil fuel use, change transportation choices, retrofit buildings

Opportunities

- GHG reduction strategies provide many co-benefits:
  - Improve air quality
  - Lower energy bills
  - Reduce fossil fuel reliance
  - Decrease traffic congestion
  - Improve pedestrian network
  - Improve public health

Why it matters locally – climate disruption

- If GHG emissions are not reduced globally, the effects of climate change on Piedmont are likely to be:
  - Worse air quality and an increase in the number of smoggy days
  - A 30% to 90% decrease in water supply
  - Increased number of heat waves
  - Up to 2.5 times more critical dry years
  - Increased wildfires
  - Spreading of climate-sensitive diseases
  - Loss of habitat for sensitive species
  - Up to 30% higher energy use

Increase in number of smoggy days

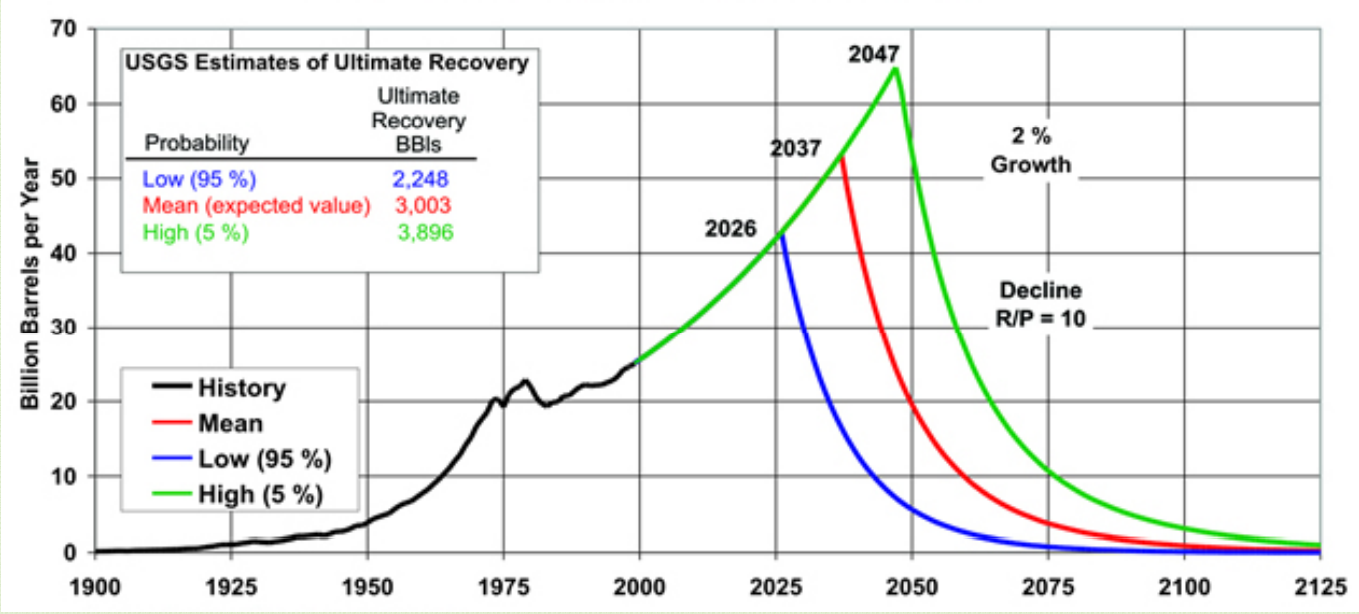
Decrease in water supply

Increase in Wildfires

Why it matters locally – energy security

- Implementing the Climate Action Plan will reduce GHG emissions
- It can also reduce Piedmont's reliance on fossil fuels and exposure to unpredictable energy prices/supplies

Annual Oil Production Scenarios with 2% Growth



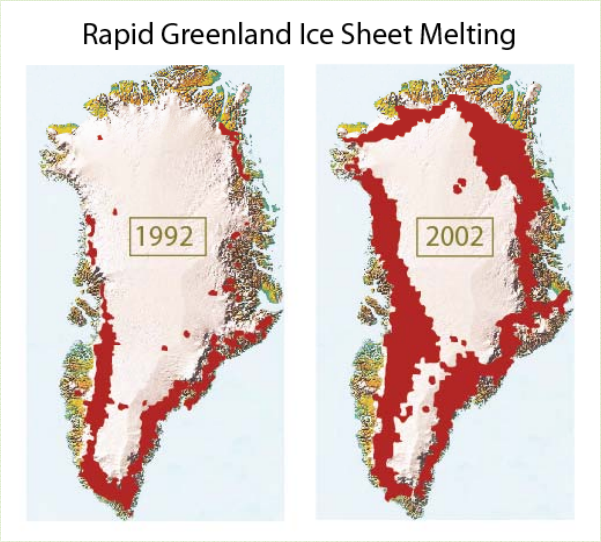
Source: US Department of Energy – Energy Information Administration 2002 – Based on US Geological Survey (USGS) Data

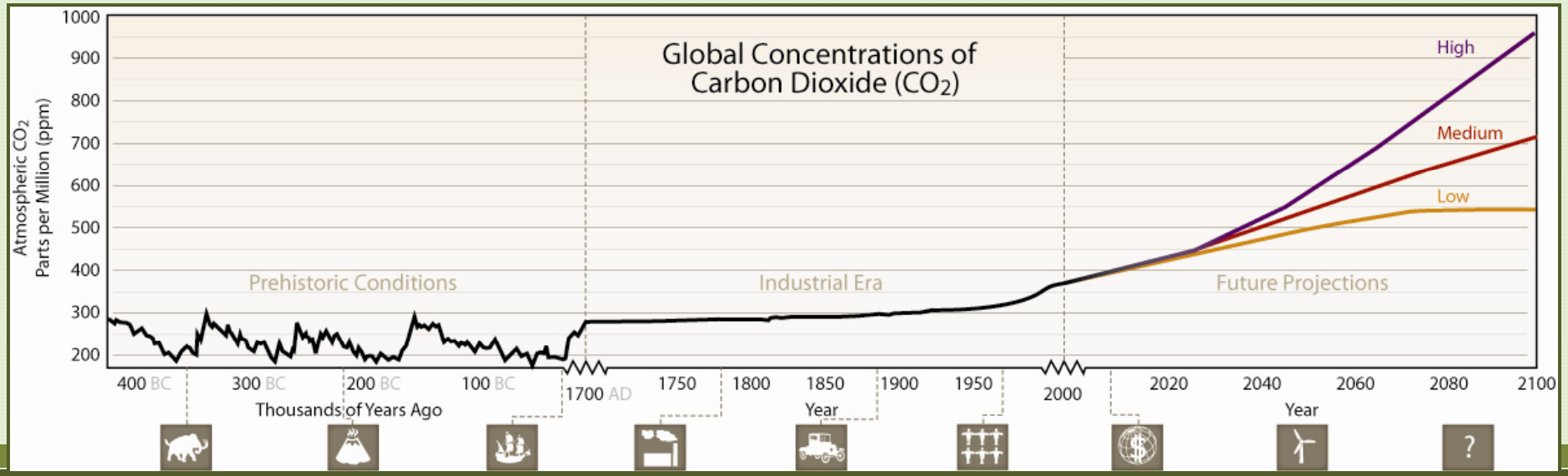
Why it matters globally

Indicators – Destabilization of Climate

- Rising temperatures
- Melting snow caps
- Sea level rise
- Extreme weather events
- Acidification of oceans (loss of coral reefs)

Global GHG emissions need to be reduced to avoid economic, ecological and political instability





California's plan to combat GHG emissions

Timeline of State Legislation

Assembly Bill 32 - ***August 2006***

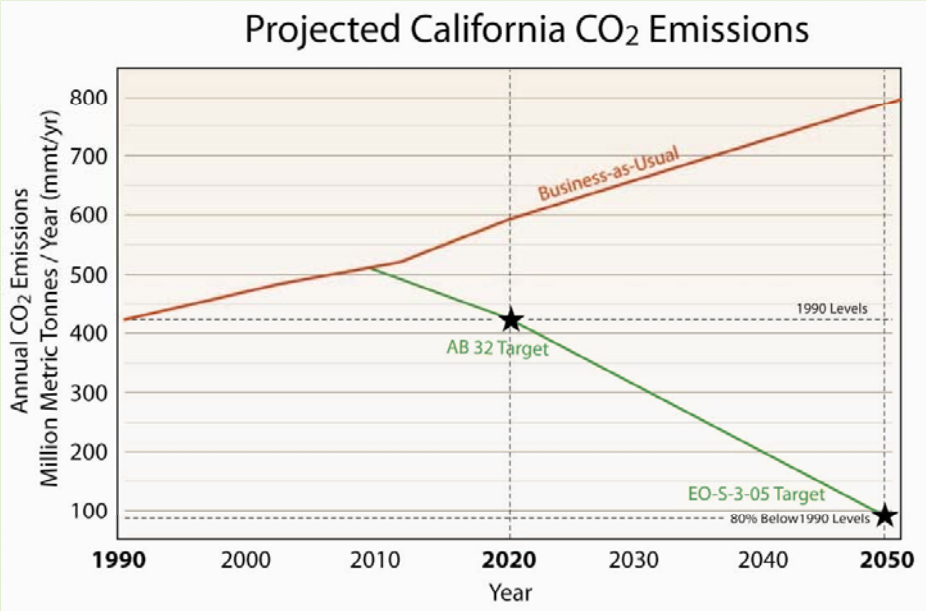
Decrease GHG emissions to 1990 levels by 2020

Executive Order- 03- 05 - ***June 2007***

Decrease GHG emissions to 80% below 1990 levels by 2050

Senate Bill 375 - ***September 2008***

Requires metropolitan planning organizations to include sustainable communities strategies in regional transportation plans for the purpose of reducing GHG emissions



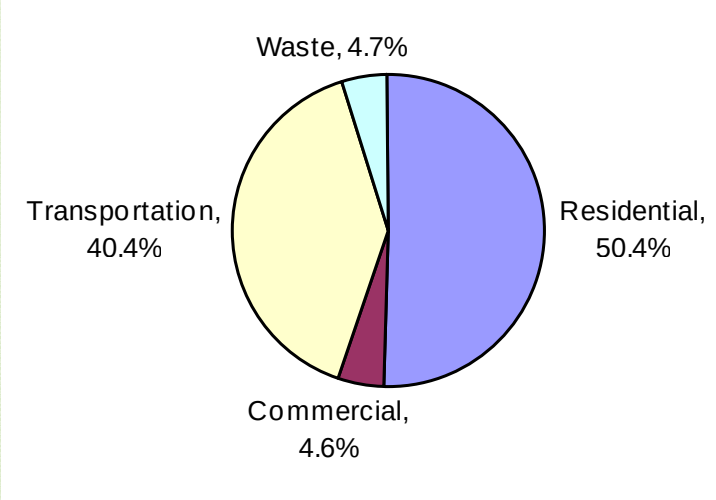
Piedmont's Climate Action Plan

- Purpose
  - Describe innovative steps for City departments and agencies to reduce GHG emissions
  - Identify steps that will reduce emissions within the community (businesses & residents)
  - Propose strategies and actions designed to achieve target GHG reduction goal
  - Create a framework for monitoring progress towards goals

Preparing the Climate Action Plan

- Key Steps
  - Propose a GHG reduction goal to be achieved by target year
  - Inventory GHG emissions from private and public activities to create base case scenario
  - Establish effective GHG reduction measures for major sources of emissions

2005 Piedmont GHG Emissions by Sector



Source: ICLEI, 2006

Considerations when selecting GHG reduction measures

- What types of emissions can the City actually control, and which are better addressed at the State level?
- What is the emission reduction potential of the measure?
- What is the total cost and related effectiveness?
- Choose the low-hanging fruit (first go after quick wins and then address longer timescale measures)
- Build on suggestions for *Greening Piedmont* (part of General Plan update survey)
- Make sure progress indicators and regular reporting procedures are established when emissions reduction targets are created

GHG reduction best practices

- Land Use
  - Focus development in transit corridors
  - Mixed residential and commercial uses
  - Walkable full-service neighborhoods
- Transportation
  - Pedestrian/bicycle infrastructure
  - Expanded public transit systems
  - Removal of minimum parking standards
- Green Building
  - Zero-energy buildings
  - LEED certification for all new buildings
  - Construction waste recycling centers

GHG reduction best practices

- Energy Efficiency
  - District heating and cooling
  - Retrofit and remodel requirements
  - Urban heat island reduction
- Renewable Energy
  - Municipal low-interest loans to homeowners
  - Green power purchase
  - Solar hot water heaters
- Water Conservation
  - Water sensitive urban design techniques
  - ‘Purple pipe’ water recycling
  - Water-efficient technologies

GHG reduction best practices

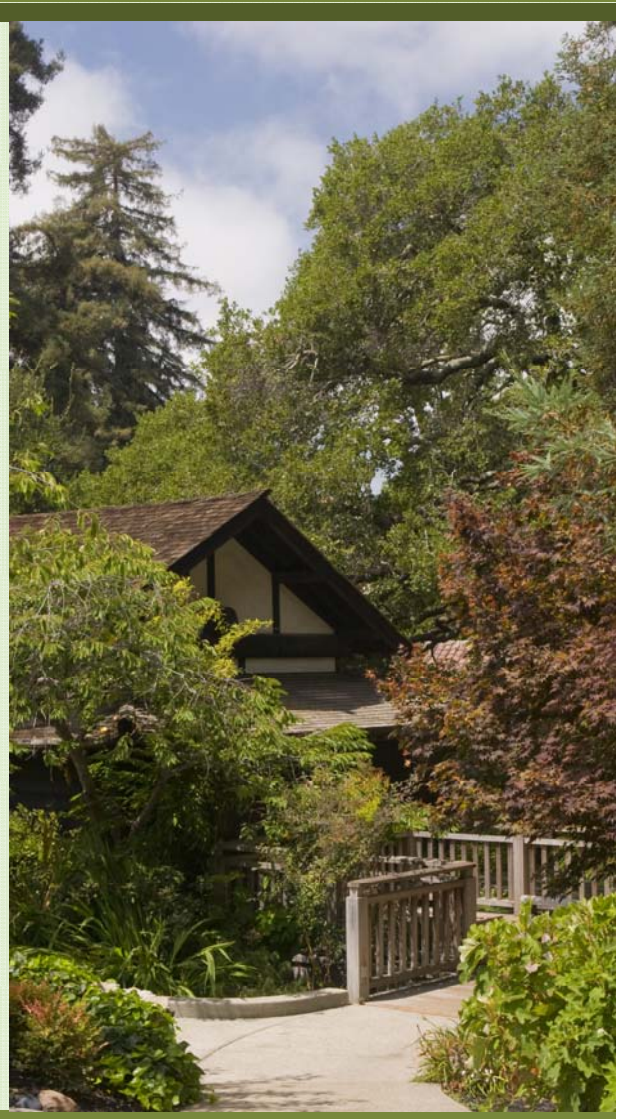
- Recycling and Waste
  - Zero-waste communities
  - Food waste and organics collection
  - Alternative fuel waste collection vehicles
- Public Outreach
  - Commercial and residential energy audits
  - ‘20% challenge’ citizen certificate program
  - Green business certification program

What can I do right now?

	Voluntary reduction steps	Emission reduction potential (tonnes/yr)
	Walk or Bike to Work and Shopping	11
	Ride Public Transit to Work	9
	Shut Off Lights + Appliances When Not Needed	.3 to .5
	Install Solar Photovoltaic Panels + Water Heater	1.5 to 6.5
	Purchase 100% Renewable Electricity	4
	Install a High Efficiency Furnace + Insulation	.5 to 4.0
	Buy Efficient Hybrid Cars (40+ MPG)	1.3 to 8

How can I get involved?

- Piedmont Environmental Task Force
  - Meets monthly
  - Meetings open to the public
- Take our online survey
  - www.ci.piedmont.ca.us/
- Calculate your carbon footprint
  - www.coolcalifornia.org
- Contact City staff
  - kjackson@ci.piedmont.ca.us



Questions and Answers

Climate Action Survey

The City of Piedmont is currently preparing a Climate Action Plan aimed at reducing the city's GHG emissions. In preparing the plan, the City would like input from its residents, employees and businesses, in order to understand the level of support for different types of reduction strategies. Thank you for participating in the following survey.

Background:
Greenhouse gas (GHG) emissions are changing the earth's climate and pose a serious threat to our economic well-being, public health, and the environment. In 2007, the California Legislature passed an Assembly Bill requiring the State to reduce GHG emissions to 1990 levels by the year 2020. In Piedmont, this means a 25 % reduction in emissions is required.

Intro Question:

1. Which of the following describes you:
    - Resident of Piedmont
    - Owner of a business in Piedmont
    - Employee of a business that operates in Piedmont
    - Other [*Text Input Box*]

Transportation
Background: Transportation generates 50% of the GHG emissions in Piedmont. Private automobile trips create a substantial part of these emissions.

2. How do you typically commute to work? (select one that represents your normal travel mode)
    - Private car (alone)
    - Carpool
    - BART
    - Ferry
    - Amtrak
    - Bus
    - Bicycle
    - Walk
    - Work from home
    - Other [*Text Input Box*]

3. How often do you ride public transit (other than to commute)? (select one)
    - Every day
    - Multiple times per week
    - Once a week
    - Every month
    - Only a few times a year
    - Never

4. Which of the following would make you consider riding transit more often? (select all that apply)
    - More convenient transit stops closer to home, work, shopping, and recreation
    - More expensive gas
    - More expensive tolls
    - Cleaner and safer transit
    - A free shuttle from public transit stations to work
    - A free shuttle to and from BART and home
    - If using transit was faster than driving
    - Other [*Text Input Box*]

5. Which of the following would make you consider riding a bicycle more often (select all that apply)
    - Traffic calming measures
    - More cycle storage facilities at stations
    - More secure parking in retail areas
    - More bike lanes
    - Safer bike lanes
    - Bike avenues where only bikes and local auto traffic is allowed

Buildings:
Background: Energy use in residential and commercial buildings accounts for approximately 45% of Piedmont's GHG emissions. Most greenhouse gas reduction strategies for buildings involve energy efficiency improvements.

6. Which of the following would you be willing to do in your home to reduce your energy usage? (select all that apply)
    - Change light bulbs to more energy efficient alternatives ($5 per bulb)
    - Replace refrigerator with more energy efficient model ($900)
    - Install tankless water heater ($2,000)
    - Insulate home ($4,000)
    - Install solar hot water heater ($5,000)
    - Install Photovoltaic Solar Panels on the roof ($18,000)
    - Others [*Text Input Box*]
    - Please list all improvements you have already made [*Text Input Box*]

7. Should the City require that residences be retrofitted to a higher level of energy efficiency at the time of resale, or major additions and remodels?
    - Yes
    - No
    - Other Comments [*Text Input Box*]

8. Should the City use taxpayer dollars to provide low interest loans to property owners who want to retrofit their homes or businesses to be more energy-efficient?

- Yes
- No
- Other Comments [*Text Input Box*]

9. Would you participate in a no-cost home or business energy audit that could demonstrate easy ways to reduce your energy consumption?
    - Yes
    - No
    - Other Comments [*Text Input Box*]

Neighborhood:
Background: Numerous studies show that, on average, people who live in pedestrian-oriented mixed-use neighborhoods make fewer vehicle trips than those who live in typical single-family neighborhoods.

10. Which of the following stores and services do you regularly walk to rather than drive?
    - Grocery store
    - Restaurant
    - Bar
    - Bakery
    - Post office
    - Hair dressers
    - Gym
    - Hardware store
    - Day care
    - Elementary school
    - None of the above
    - Other [*Text Input Box*]

Effective pedestrian/bicycle networks are also critical to reduce vehicle trips and related emissions.

11. From your home or office, how long would it take to safely walk to purchase daily goods and services (grocery store, café, post office, bakery, gym, restaurants)?
    - 5 minutes
    - 10 minutes
    - 15 minutes
    - Greater than 15 minutes
    - Not possible

12. Do safe routes exist for children to walk or bike to school in your neighborhood?
    - Yes
    - They are okay, but not great. (How would you improve this?) [*Text Input Box*]

- No (How would you improve this?)

Renewable Energy:
Background: Renewable energy (such as wind, solar, hydroelectric, and geothermal energy) has the potential to greatly reduce emissions. Many utilities are investing in renewable energy to reduce emissions and to offer customers greener energy options.

13. The average Bay Area household spends $150 a month on home energy bills. Would you be willing to spend an additional $6 a month on your energy bill to offset all GHG emissions associated with the energy used in your home?
    - Yes
    - No
    - Other Comments [*Text Input Box*]

14. Should the City install photovoltaic panels on City buildings and properties?
    - Yes
    - No
    - Other Comments [*Text Input Box*]

15. Should the City install wind turbines on City properties?
    - Yes
    - No
    - Other Comments [*Text Input Box*]

Water:
Providing, transporting and purifying water in California consumes large amounts of energy and creates substantial GHG emissions.

16. Which of the following water saving strategies should the City and the Utility District implement?
    - Provide credits on water bills if a household uses less than an established number of gallons per month
    - Provide no-cost voluntary home and business water audits to identify ways to reduce both consumption and water bills
    - Charge high water users progressively higher rates
    - Require new construction and major remodels/additions to use the lowest water consuming appliances available
    - Other Comments [*Text Input Box*]

Support for Emission Reductions:
17. To what extent would you support City-led efforts to meet mandated greenhouse gas emissions targets?
    - I would not support the efforts at all.
    - I would support voluntary incentive-based measures, but that is all.

- I would support the City in creating mandatory requirements in order to meet the targets.
- I would support mandatory requirements and increased taxes in order to meet the targets.

Participant Information:
Please provide a little information about yourself. Please note that all answers are anonymous and optional.

18. What is your age?
    - 18 or under
    - 18-34
    - 35-65
    - 65 or over

19. Do you own or rent property in the City?
    - Property Owner
    - Renter/Tenant

20. What is your household's annual income?
    - 0 to 20,000
    - $20,000 to $40,000
    - $40,000 to $70,000
    - $70,000 to $100,000
    - $100,000 to $250,000
    - $250,000 to $350,000
    - $350,000+

Thank you for completing our survey. If you would like more information regarding the City's Climate Action Plan, please contact Kevin Jackson, Assistant Planner, at (510) 420-3039.

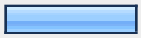
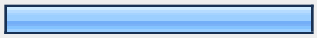
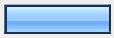
Data Sources:

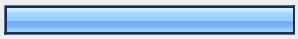
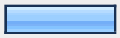
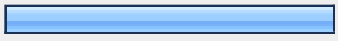
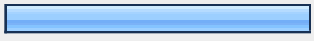
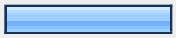
- ***American Council for an Energy Efficient Economy*** *– solar water heater price (http://www.aceee.org/consumerguide/waterheating.htm)*
- ***City of Piedmont and ICLEI –*** *2006 greenhouse gas inventory*
- ***Costhelper.com*** *– home insulation costs (http://www.costhelper.com/cost/home-garden/insulation.html)*
- ***Nevada Power*** *– Price of solar PV panels and installation – (http://www.nevadapower.com/renewablesenvironment/renewablegenerations/faqs.cfm)*
- ***Pacific Gas and Electric*** *– CFL bulb data and monthly household energy costs – (http://www.pge-cfl.com/) and (http://www.pge.com/microsite/calculator/calc1.jsp)*
- ***State of Hawaii*** *– Department of Business, Economic Development and Tourism – home insulation data – (http://hawaii.gov/dbedt/info/energy/publications/roofinsulation.pdf)*
- ***US EPA – Energy Star Program*** *– efficient refrigerator data – (http://www.energystar.gov/index.cfm?fuseaction=refrig.display_products_html)*

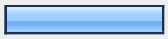
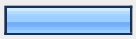
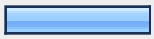
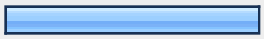
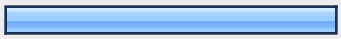
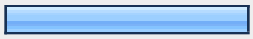
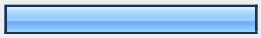
Piedmont Climate Action Plan Survey

1. Which of the following describes you: (select all that apply)		
	Response Percent	Response Count
Resident of Piedmont	**97.4%**	**185**
Owner of a business in Piedmont	1.1%	2
Employee of a business that operates in Piedmont	2.1%	4
Other (please specify)	2.1%	4
answered question		**190**
skipped question		**2**

2. How do you typically commute to work? (select one that represents your normal travel mode)		
	Response Percent	Response Count
Private car (alone)	**38.8%**	**73**
Carpool	14.4%	27
BART	2.7%	5
Ferry	0.5%	1
Amtrak	0.5%	1
Bus	5.3%	10
Bicycle	3.2%	6
Walk	2.7%	5
Work from home	19.7%	37
Other (please specify)	12.2%	23
answered question		**188**
skipped question		**4**

3. How often do you ride public transit (other than to commute)? (select one)			
		Response Percent	Response Count
Every day		3.2%	6
Multiple times per week		2.2%	4
Once a week		11.8%	22
Every month		19.9%	37
Only a few times a year		**47.3%**	**88**
Never		15.6%	29
	answered question		**186**
	skipped question		**6**

4. Which of the following would make you consider riding transit more often? (select all that apply)			
		Response Percent	Response Count
More convenient transit stops closer to home, work, shopping, and recreation		44.3%	78
More expensive gas		16.5%	29
More expensive tolls		9.1%	16
Cleaner and safer transit		13.1%	23
A free shuttle from public transit stations to work		9.1%	16
A free shuttle to and from BART and home		**50.6%**	**89**
If using transit was faster than driving		46.6%	82
Other (please specify)		25.0%	44
	answered question		**176**
	skipped question		**16**

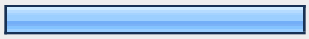
5. Which of the following would make you consider riding a bicycle more often? (select all that apply)			
		Response Percent	Response Count
Traffic calming measures		23.9%	38
More cycle storage facilities at stations		18.9%	30
More secure parking in retail areas		22.0%	35
More bike lanes		39.0%	62
Safer bike lanes		**50.9%**	**81**
Bike avenues where only bikes and local auto traffic is allowed		37.1%	59
Other (please specify)		38.4%	61
	answered question		**159**
	skipped question		**33**

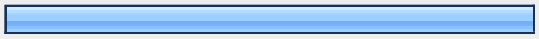
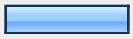
6. Which of the following would you be willing to do (or have already done) in your home to reduce your energy usage? (select all that apply)

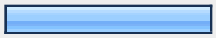
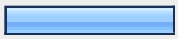
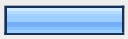
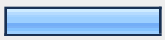
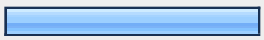
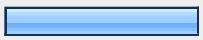
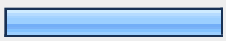
	Response Percent	Response Count
Change light bulbs to more energy efficient alternatives ($5 per bulb)	**85.7%**	**150**
Replace refrigerator with more energy efficient model ($900)	61.1%	107
Install tankless water heater ($2,000)	36.0%	63
Insulate home ($4,000)	64.0%	112
Install solar hot water heater ($5,000)	22.3%	39
Install photovoltaic solar panels on the roof ($18,000)	36.6%	64
Other (please specify)	26.3%	46
	answered question	**175**
	skipped question	**17**

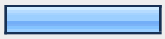
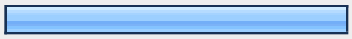
7. Should the City require that residences be retrofitted to a higher level of energy efficiency at the time of resale, or major additions and remodels? (select one)

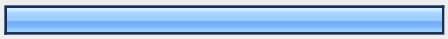
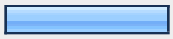
	Response Percent	Response Count
Yes	41.6%	74
No	**58.4%**	**104**
	Comments	71
	answered question	**178**
	skipped question	**14**

8. Should the City use taxpayer dollars to provide low interest loans to property owners who want to retrofit their homes or businesses to be more energy-efficient? (select one)			
		Response Percent	**Response Count**
Yes		**54.1%**	**93**
No		45.9%	79
		Comments	45
		answered question	**172**
		skipped question	**20**

9. Would you participate in a no-cost home or business energy audit that could demonstrate easy ways to reduce your energy consumption? (select one)			
		Response Percent	**Response Count**
Yes		**81.3%**	**143**
No		18.8%	33
		Comments	24
		answered question	**176**
		skipped question	**16**

10. Which of the following stores and services do you regularly walk to rather than drive? (select all that apply)			
		Response Percent	**Response Count**
Grocery store		31.4%	55
Restaurant		25.7%	45
Bar		4.0%	7
Bakery		6.9%	12
Post office		17.7%	31
Hair dressers		4.0%	7
Gym		10.3%	18
Hardware store		23.4%	41
Day care		2.9%	5
Elementary school		**38.9%**	**68**
None of the above		29.1%	51
Other (please specify)		33.1%	58
	answered question		**175**
	skipped question		**17**

11. From your home or office, how long would it take to safely walk to purchase daily goods and services (grocery store, café, post office, bakery, gym, restaurants)? (select one)			
		Response Percent	Response Count
5 minutes		4.6%	8
10 minutes		11.5%	20
15 minutes		23.6%	41
Greater than 15 minutes		**52.3%**	**91**
Not possible		8.0%	14
		Comments	29
		answered question	**174**
		skipped question	**18**

12. Do safe routes exist for children to walk or bike to school in your neighborhood? (select one)			
		Response Percent	Response Count
Yes		**67.4%**	**120**
They are okay, but not great. (How would you improve this?)		24.7%	44
No (How would you improve this?)		7.9%	14
		Comments	56
		answered question	**178**
		skipped question	**14**

13. The average Bay Area household spends $150 a month on home energy bills. Would you be willing to spend an additional $6 a month on your energy bill to offset all GHG emissions associated with the energy used in your home? (select one)

	Response Percent	Response Count
Yes	**57.8%**	**96**
No	42.2%	70
Comments		48
answered question		**166**
skipped question		**26**

14. Should the City install photovoltaic panels on City buildings and properties? (select one)

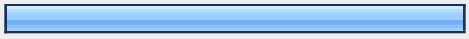
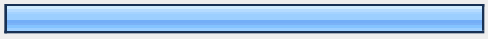
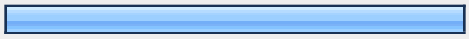
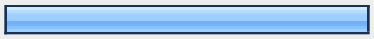
	Response Percent	Response Count
Yes	**81.8%**	**130**
No	18.2%	29
Comments		65
answered question		**159**
skipped question		**33**

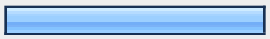
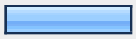
15. Should the City install wind turbines on City properties? (select one)

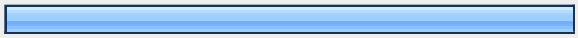
	Response Percent	Response Count
Yes	42.8%	62
No	**57.2%**	**83**
Comments		88
answered question		**145**
skipped question		**47**

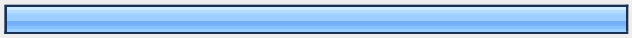
16. Which of the following water saving strategies should the City and the Utility District implement? (select all that apply)

	Response Percent	Response Count
Provide credits on water bills if a household uses less than an established number of gallons per month	64.6%	106
Provide no-cost voluntary home and business water audits to identify ways to reduce both consumption and water bills	**76.8%**	**126**
Charge high water users progressively higher rates	62.2%	102
Require new construction and major remodels/additions to use the lowest water consuming appliances available	59.1%	97
Comments		47
answered question		**164**
skipped question		**28**

17. Which of the following waste reduction strategies should the City implement? (select all that apply)			
		Response Percent	Response Count
Establish a City goal to become a ‘ Zero Waste’ community.		53.1%	78
Adopt a City goal that no compostable organics (food scraps, yard trimmings, etc) go to landfills or incinerators by 2015.		70.7%	104
Provide incentives to encourage on-site composting at homes, schools, and businesses with sufficient space.		**73.5%**	**108**
Require construction waste minimization and recycling standards for all new construction, major addition and remodel projects.		70.7%	104
Ban single-use plastic shopping bags		56.5%	83
Prohibit polystyrene restaurant take-out containers		67.3%	99
Explore the creation of a resource recovery district within the City to facilitate recycling, composting, and reuse of materials.		55.8%	82
Work with other cities and agencies to create ‘Extended Producer Responsibility’ legislation that would require companies to take back designated products at the end of the product life cycle.		67.3%	99
		Comments	45
		answered question	**147**
		skipped question	**45**

18. To what extent would you support City-led efforts to meet mandated greenhouse gas emissions targets? (select one)			
		Response Percent	Response Count
I would not support the efforts at all.		10.1%	17
I would support voluntary incentive-based measures, but that is all.		**39.6%**	**67**
I would support the City in creating mandatory requirements in order to meet the targets.		31.4%	53
I would support mandatory requirements and increased taxes in order to meet the targets.		18.9%	32
	answered question		**169**
	skipped question		**23**

19. What is your age? (select one)			
		Response Percent	Response Count
18 or under		2.9%	5
18-34		2.9%	5
35-65		**87.7%**	**150**
65 or over		6.4%	11
	answered question		**171**
	skipped question		**21**

20. Do you own or rent property in the City? (select one)			
		Response Percent	Response Count
Property Owner		**95.8%**	**160**
Renter/Tenant		4.2%	7
	answered question		**167**
	skipped question		**25**

21. What is your household's annual income? (select one)			
		Response Percent	Response Count
0 to $20,000		0.0%	0
$20,000 to $40,000		2.0%	3
$40,000 to $70,000		5.3%	8
$70,000 to $100,000		6.6%	10
$100,000 to $250,000		**44.7%**	**68**
$250,000 to $350,000		19.7%	30
$350,000+		21.7%	33
	answered question		**152**
	skipped question		**40**

Appendix C.

Measure Cost Analysis

Appendix C - Measure Cost Analysis

Building and Energy Strategy - *Minimize energy consumption, create high performance buildings, and transition to clean renewable energy sources*

Objective BE-1: Reduce energy use in City buildings

Measure		Estimated Avg Annual Cost	Public Works 08/09 Operating Budget ($4,098,141)	CIP 08/09 Budget ($525,000)	Simplified Cost [Public Works Budget: If less than 1% = low, 1% - 5% = med, greater than 5% = high; CIP Budget: If less than 25% = low, 26% - 75% = med, greater than 75% = high	Private Cost	Notes	Source
BE-1.1	Install cost-effective renewable energy systems on all city buildings and purchase remaining electricity from renewable sources.	$5,714	0.1%		Low	No	Assume City will participate in Power Purchase Agreement (PPA) with solar company to lease panels. Leasing is at no cost to City. 100% renewable energy purchases only possible if the City joins Community Choice Aggregation efforts of Oakland and Berkeley. Otherwise City could participation in the PG&E commercial climate smart program, which is just a small increase over current rates. Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW, SolarCity, Sun Light & Power
BE-1.2	Install building performance data (energy and water) displays in all City buildings.	$5,238	0.1%		Low	No	Dashboard starter (electricity only): $10,000 + $950 for each additional resource (assume city will monitor electricity and water). Annual service fee + data hosting: $3,000 per year. Free for first year. Assume City has 1 main public buildings. Touch screen available + installation: $9,950 (32 inch flat screen + preconfigured). Grand Total: $41,900 for 8 years	Lucid Design Group

Objective BE-2: Consider retrofitting existing residential buildings

Measure		Estimated Avg Annual Cost	Public Works 08/09 Operating Budget ($4,098,141)	CIP 08/09 Budget ($525,000)	Simplified Cost Estimate (Cost to City)	Private Cost	Notes	Source
BE-2.1	Consider developing and implementing point-of-sale residential energy and water efficiency upgrade requirements and/or incentives if necessary.	$5,714	0.1%		Low	Yes	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
BE-2.2	Identify and consider developing financial incentives and low-cost financing products and programs that encourage investment in energy efficiency and renewable energy within existing residential buildings.					Yes		
A	On-bill Financing	$5,714	0.1%		Low		City could coordinate with PG&E to facilitate the repayment of loans for efficiency upgrades on utility bills. Upgrades would be selected by the building owner (in coordination with the City) such that the efficiency savings would pay for the investment over a fixed period of time. Customers would "share" monthly energy efficiency savings with the utility until the loan is paid back, at which point all savings would be reflected in lower monthly bills. The goal is to simplify loan repayment and (in combination with a funding source) reduce upfront cash outlay by property owners. In addition, some models of on-bill financing would allow for the loan to remain with the property (even if sold by the current owner), thereby sharing the cost of upgrades over time with future beneficiaries of those upgrades. Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
B	Low Interest Loans	$80,625	2.0%		Med		The City, utilities, or private lenders could offer loans to property owners for pre-approved energy efficiency upgrades. Low interest rates could be guaranteed through volume or by City buy-down. The goal is to to provide capital for energy efficiency upgrades at a discounted rate. Initial Costs: Policy assessment: $20,000 - $50,000. The City would need to assess strategies for maximizing the effectiveness of a low interest loan program, educating a contractor/auditor network and addressing the split incentives between investors and energy end-users (e.g., between a landlord and tenant). Development of billing and collection process: $20,000 - $100,000. If the City manages the loan program in-house and intends to affix the loan to the property, then a repayment system would have to be arranged. Initial or Annual Costs (depending on structure of financing): City investment: $100,000-$1,000,000. This investment is wholly dependent on how much the City intends to subsidize interest rates.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
C	Energy Efficiency Mortgages	$10,625	0.3%		Low		Energy Efficiency Mortgages can provide owners additional financing (whether at time-of-sale or upon refinancing) for energy efficiency improvements at discounted interest rates. Energy efficiency upgrades could be chosen that would allow owners to realize a net monthly savings. The goal is to provide capital for energy efficiency upgrades at a discounted interest rate. Initial Costs: Partner development: $20,000 – $50,000. Costs to the City would generally be low because these products would be administered through private lenders, but the City would need to devote some financial resources to assisting with partner recruiting. Technology upgrades: $0 – $100,000. Depending on the City's role in administration, there may be costs incurred in development of a database to track and verify energy efficiency upgrades in participating properties.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
D	Revolving Loan from Bond Sale	$13,125	0.3%		Low		Energy savings could be financed through a (potentially tax-exempt) municipal bond issue. The City would administer a revolving loan fund with the bond proceeds. The goal is to provide capital for energy efficiency upgrades at the lowest cost of capital possible. Initial Costs: Policy assessment: $40,000 - $100,000. Further research would be needed to consider whether the City's internal funds would be a better (less expensive, more flexible) option than bonds. Technology upgrades: $20,000 - $50,000. Depending on the repayment mechanism and administrative system chosen by the City, some costs would be incurred for establishing a tracking system to manage the loan fund that results from the revenue bond issue.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
E	Energy Efficient Local Improvement District	$40,625	1.0%		Low/Med		Monitoring and enforcement cost: Implementation costs to the City are largely dependent on the capacity of the City for policy administration and enforcement. Additional staff training would need to take place to ensure officials fully understand the code requirements. Additional staff may also be required in order to meet the increased administration and implementation workload, particularly in the period immediately prior to and following the code's implementation. While implementation costs are likely to be high, once introduced, ongoing policy development costs to the City are likely to be manageable as updates would be conducted in line with the City's existing cyclic code review process. Initial Costs: Cost of adopting an ordinance + training City staff to administer program/process applications: ~$10,000 - possible additional education and outreach related expenses. Annual Costs: Monitoring and enforcement cost: ~$10,000 + possible additional staff	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
BE-2.3	Educate residents about the availability of free home energy audit programs and encourage implementation of audit findings.	$3,750	0.1%		Low	No	Assume many marketing/education-related strategies could be addressed concurrently. EDAW community-outreach professionals recommend a high tech approach consisting of a video clip, newsletter, and website activity. $75,000 per campaign (2-3 strategies per campaign) for strategies-related to marketing. Assume 2 advertising campaigns would take place for the CAP = $150,000 for all strategies	EDAW

Measure		Estimated Avg Annual Cost	Public Works 08/09 Operating Budget ($4,098,141)	CIP 08/09 Budget ($525,000)	Simplified Cost Estimate (Cost to City)	Private Cost	Notes	Source
Objective BE-3: Consider retrofitting existing commercial buildings								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
BE-3.1	Consider developing and implementing point-of-sale commercial energy efficiency upgrade requirements and/or incentives if necessary.	$5,714	0.1%		Low	Yes	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
BE-3.2	Identify and develop financial incentives and low-cost financing products and programs to encourage investment in energy efficiency and renewable energy within existing commercial buildings.					Yes		
A	On-bill financing	$5,714	0.1%		Low		City could coordinate with PG&E to facilitate the repayment of loans for efficiency upgrades on utility bills. Upgrades would be selected by the building owner (in coordination with the City) such that the efficiency savings would pay for the investment over a fixed period of time. Customers would "share" monthly energy efficiency savings with the utility until the loan is paid back, at which point all savings would be reflected in lower monthly bills. Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs. The goal is to simplify loan repayment and (in combination with a funding source) reduce upfront cash outlay by property owners. In addition, some models of on-bill financing would allow for the loan to remain with the property (even if sold by the current owner), thereby sharing the cost of upgrades over time with future beneficiaries of those upgrades.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
B	Low Interest Loans	$80,625	2.0%		Med		The City, utilities, or private lenders could offer loans to property owners for pre-approved energy efficiency upgrades. Low interest rates could be guaranteed through volume or by utility buy-down. The goal is to to provide capital for energy efficiency upgrades at a discounted rate. Initial Costs: Policy assessment: $20,000 - $50,000. The City would need to assess strategies for maximizing the effectiveness of a low interest loan program, educating a contractor/auditor network and addressing the split incentives between investors and energy end-users (e.g., between a landlord and tenant). Development of billing and collection process: $20,000 - $100,000. If the City manages the loan program in-house and intends to affix the loan to the property, then a repayment system would have to be arranged. Initial or Annual Costs (depending on structure of financing): City investment: $100,000-$1,000,000. This investment is wholly dependent on how much the City intends to subsidize interest rates.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
C	Revolving Loan from Bond Sale	$13,125	0.3%		Low		Energy savings could be financed through a (potentially tax-exempt) municipal bond issue. The City would administer a revolving loan fund with the bond proceeds. The goal is to provide capital for energy efficiency upgrades at the lowest cost of capital possible. Initial Costs: Policy assessment: $40,000 - $100,000. Further research would be needed to consider whether the City's internal funds would be a better (less expensive, more flexible) option than bonds. Technology upgrades: $20,000 - $50,000. Depending on the repayment mechanism and administrative system chosen by the City, some costs would be incurred for establishing a tracking system to manage the loan fund that results from the revenue bond issue.	Cascadia Consulting Group, Inc. Existing Building Energy Policy Analysis
BE-3.3	Partner with PG&E to provide a business education program that encourages commercial energy efficiency improvements.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
Objective BE-4: Consider requiring energy performance in new construction								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
BE-4.1	Consider adopting additional standards for energy and water efficiency compliant with non-mandatory sections of the State of California Green Building Code if necessary.	$5,714	0.1%		Low	Yes	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
BE-4.2	Provide development incentives for buildings that exceed the State's current Title-24 standards for energy efficiency by 25%.				Low	No	Priority permitting creates an incentive for developers to incorporate green building practices and/or achieve specified energy efficiency objectives by giving greater assistance and facilitation through the permitting process for qualified projects. Assume to be no cost to City if priority permitting only includes expedited permitting.	EDAW Seattle Green Building Policy Analysis
Objective BE-5: Maximize the use of renewable energy								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
BE-5.1	Develop comprehensive renewable energy financing and informational program for residential and commercial uses.	$3,750	0.1%		Low	Yes (No, if PPA)	Assume renewable energy could be provided through solar PPAs. No cost to homeowner. Program needs to be advertised. Assume many marketing/education-related strategies could be addressed concurrently. EDAW community-outreach professionals recommend a high tech approach consisting of a video clip, newsletter, and website activity. $75,000 per campaign (2-3 strategies per campaign) for strategies-related to marketing. Assume 2 advertising campaigns would take place for the CAP = $150,000 for all strategies	EDAW
BE-5.2	Join Bay Area efforts to ensure green public transit energy sourcing.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
Objective BE-6: Community energy management								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
BE-6.1	Work with Alameda County to convert street lights to LED bulbs or LED-solar systems.				Low	No	Assume County would pay for all of costs, as LED/solar lights should save the County money in the long-term. $410 - $825 per light (inc. installation).	Report by Energy Solutions (Dec. 2008). "LED Street Lighting. Host Site: San Francisco, California." http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_sf-streetlighting.pdf
BE-6.2	Research the feasibility of joining the Community Choice Aggregation efforts of Berkeley, Oakland, and Emeryville.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
BE-6.3	Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW

Measure		Estimated Avg Annual Cost	Public Works 08/09 Operating Budget ($4,098,141)	CIP 08/09 Budget ($525,000)	Simplified Cost Estimate (Cost to City)	Private Cost	Notes	Source
Waste and Water Strategy - ***Minimize waste and celebrate water as an essential community resource***								
Objective WW-1: Become a zero waste community								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
WW-1.1	Establish a zero-waste target for 2030 and work with Alameda County, neighboring cities, and other organizations to leverage the zero-waste effort.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
WW-1.2	Establish an environmentally responsible government purchasing policy.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
Objective WW-2: Conserve water resources								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
WW-2.1	Encourage residential and commercial users to participate in EBMUD's free water audit program.	$3,750	0.1%		Low	Yes, assuming property owners follow through with recommended changes	Assume many marketing/education-related strategies could be addressed concurrently. EDAW community-outreach professionals recommend a high tech approach consisting of a video clip, newsletter, and website activity. $75,000 per campaign (2-3 strategies per campaign) for strategies-related to marketing. Assume 2 advertising campaigns would take place for the CAP = $150,000 for all strategies	EDAW
WW-2.2	Encourage use of greywater and rainwater collection in existing residential and commercial uses.	$3,750	0.1%		Low	Yes	Assume many marketing/education-related strategies could be addressed concurrently. EDAW community-outreach professionals recommend a high tech approach consisting of a video clip, newsletter, and website activity. $75,000 per campaign (2-3 strategies per campaign) for strategies-related to marketing. Assume 2 advertising campaigns would take place for the CAP = $150,000 for all strategies	EDAW
WW-2.3	Develop a water-efficient landscaping ordinance to implement the California Water Efficient Landscaping Ordinance and to require or facilitate use of greywater or rainwater collection systems in new construction.	$5,714	0.1%		Low	Yes	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
WW-2.4	Facilitate the installation of weather-based evapotranspiration (ET) controller irrigation systems in both City and private landscapes.	$5,714	0.1%		Low	Yes	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
Transportation and Land Use Strategy - ***Shift travel from automobiles to walking, biking, and public transit***								
Objective TL-1: Facilitate walking and biking in the community								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
TL-1.1	Consider expanding and enhancing bicycling and pedestrian infrastructure throughout the community if financially feasible and practical.				High	No	Variable cost depending on project needs. Alta Planning cost estimates: Bike Path - $500,000 - $3,000,000 per mile (high end indicates grade-separated crossings every 1-2 miles); Bike Lanes - $25,000-$50,0000 per mile (could be more if it requires road widening and ROW acquisition); Bike Routes - $5,000-$50,0000 per mile (depends on level of treatment: route signage only would be low end, signage + shoulder striping, pavement markings, signal actuation would be higher end). Portland's Cully Blvd (separated cycle track similar to Copenhagen + street re-design) cost the City $5.4M for 0.6 miles.	Alta Planning, City of Portland
TL-1.2	Install bicycle racks in commercial and civic areas of the City where racks do not currently exist.	$1,200		0.2%	Low	No	Cost is $200 per 2-bike rack ($150 per rack + $50 for installation). Assume 60 new racks.	Alta Planning, Creative Pipe, SFMTA
TL-1.3	Consider incorporating pedestrian-friendly design features into the City's civic/commercial centers.				High	No	Assumed improvements will include narrowed lanes, bulb outs, medians, street trees, and enhanced cross walks. Given the small Capital Improvement budget of Piedmont, this would be a high cost to the City.	EDAW
TL-1.4	Evaluate the potential for mixed-use development in Piedmont's existing commercial center.	$20,000	0.5%		Low	No	Rezoning plan with EIR is estimated to cost $200,000	EDAW
Objective TL-2: Make public transit more accessible and user-friendly								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
TL-2.1	Work with AC transit to conduct a public transit gap study and provide bus stops with safe and convenient bicycle and pedestrian access and essential improvements.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
Objective TL-3: Reduce vehicle emissions and trips								
Measure		**Estimated Avg Annual Cost**	**Public Works 08/09 Operating Budget ($4,098,141)**	**CIP 08/09 Budget ($525,000)**	**Simplified Cost Estimate (Cost to City)**	**Private Cost**	**Notes**	**Source**
TL-3.1	Improve fuel efficiency of the City vehicle fleet by purchasing low- or zero-emission vehicles when vehicles are retired from service. (Emergency vehicles are exempt from this measure)	$52,000		10%	Low	No	Estimated cost per hybrid vehicle: $26,000. Assume City will replace 2 vehicles per year.	EDAW
TL-3.2	Provide preferential public parking spaces for electric and plug-in electric hybrid vehicles.				Low	Yes	Low cost. Loss of revenue associated with reduced parking fees	EDAW
TL-3.3	Facilitate ride-share opportunities for community residents.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP	
TL-3.4	Work with schools to improve/expand walking, school bus use, safe routes to school programs, and trip reduction programs.	$5,714	0.1%		Low	No	Assume City will have access to a shared green building/sustainability professional at ($80,000 + benefits/overhead = $200,000) who will be responsible for implementing CAP strategies. Staff- and cost-sharing arrangements with other Alameda County cities would reduce costs.	EDAW
TL-3.5	Provide public education regarding reducing motor vehicle-related greenhouse gas emissions.	$3,750	0.1%		Low	No	Assume many marketing/education-related strategies could be addressed concurrently. EDAW community-outreach professionals recommend a high tech approach consisting of a video clip, newsletter, and website activity. $75,000 per campaign (2-3 strategies per campaign) for strategies-related to marketing. Assume 2 advertising campaigns would take place for the CAP = $150,000 for all strategies	EDAW